SEXTANT

Special
Z100
Section

$2.95
Fall 1983
Issue No. 7

The Independent Magazine for the Entire Zenith Computer Community

A Look at Over 80 Software Products for the H/Z100

Also in this issue:

BASIC and Machine Language Team Up to
Index Your HDOS Disks

Make Your '8 Think Like an '89—Only Faster

dBASE II comes to Heath/Zenith

Confessions of a Technoklutz

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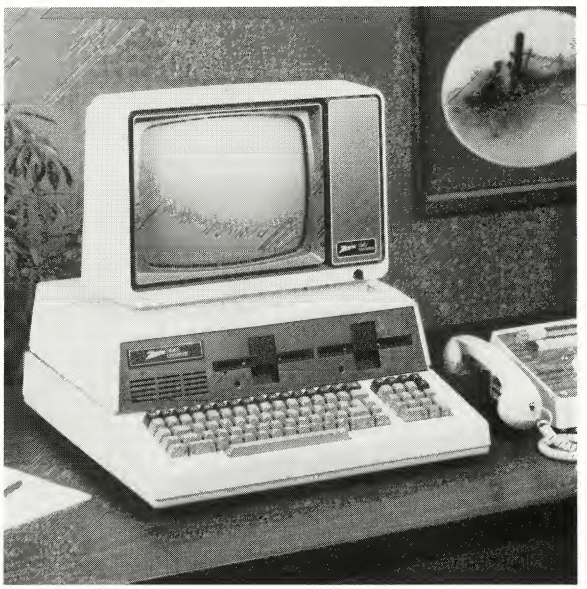

Photo Courtesy of Zenith Data Systems

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We all need equipment to work. But we also need equipment to work *with*. We need equipment that's understandable, consistent, and designed to avoid discomfort and confusion on the part of the user. To that end, telling us what to look for is the province of the human-factors analyst. One of them takes a look at his own Z100 to see how it stacks up.

Features

dBASE II Comes to Heath/Zenith
Wayne Rash, Jr. 9
For many of us, "data base" and "manageable" are mutually exclusive terms. We have information lying around all over the place. We need a way to ram it down our computers' throats so they can regurgitate it back to us in a more palatable form. For small businesses and for many hobbyists, dBASE II may be the way to go.

Unconfusing the New User
L. R. (Roy) Broun 17

BASIC Battleship
Clair Doughty 25

Make Your '8 Think Like an '89—Only Faster
Clay Jackson 29
The H8 lives! And grows, too. Sometime, you may want your H8's brain to have a heart transplant. Its 8080 central processor is nice, but with a Z80, your '8 can think like an '89 at twice the speed. Trionyx Electronics can help you do it.

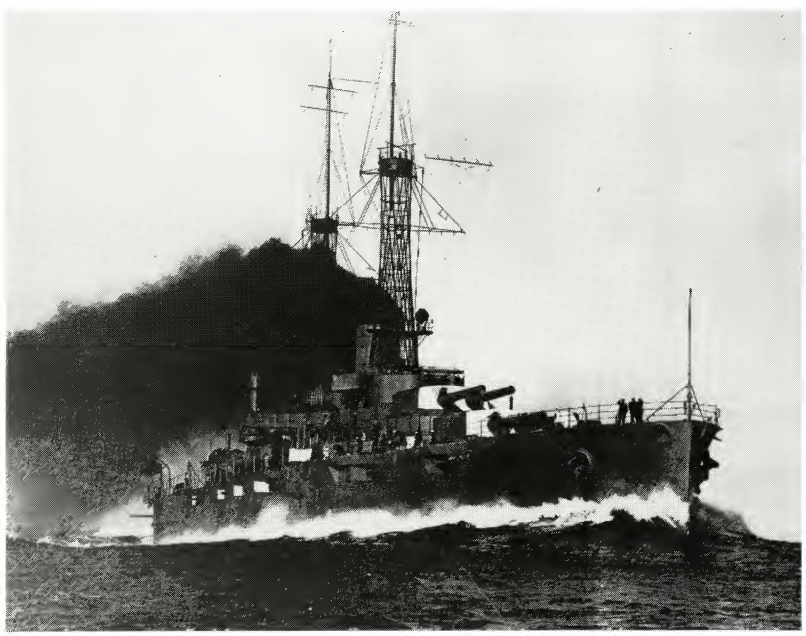

Photo Courtesy of the National Archives

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We're not sure how old the game of "Battleship" is—probably at least as old as the *U.S.S. New York*, pictured here circa 1915. Well, they've brought back the *U.S.S. New Jersey*, so why not bring the game up to date, too? The game you played as a kid you can play again—this time against your computer.

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Word Processing You Can Program
Walter G. Jung 33
Whether you write a book a week or a letter a month, word processing software makes life a lot easier. Spellbinder is a popular high-end word processor package available for users of Heath/Zenith computers. A professional writer likes what he sees in it. Is it for you, too?

Z100 Special Section

Building Heathkit's H120
Hurley D. Cook 45
From across the room it's a "Z-Machine"—one of Zenith's Z100s. But come closer. That shiny nameplate says "Heathkit Computer." And no one would guess that only a few days ago it was just a pile of parts in the basement.

A Human Factors Evaluation of the Z110
Richard M. Kane 55

Z100 Software Roundup
Frederick Zimmerman 64
A computer is only as good as its software. So we decided to see what software is available for the Z100. We already knew that you could run all the CP/M-80 software on the '100 from day one. But that was a year ago. So we looked for software that was written or customized specifically for the '100—software that was designed to take full advantage of the '100's increased speed, graphics capability, and whatnot. What did we find? A lot—over 80 new products in the '100's first year. They're described here.

Index Your HDOS Disks
Stephen E. Auyer 88

Confessions of a Technoklutz
Virginia Vineyard 97
Do you know any technoklutzes? Are they beset by self-doubt? An embarrassment to friends? Ridiculed by strangers? Tell them there is hope. If you're too tactful to raise the subject, just leave *Sextant* out where they'll see it—open to this article.

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Cover Photo by Hurley D. Cook

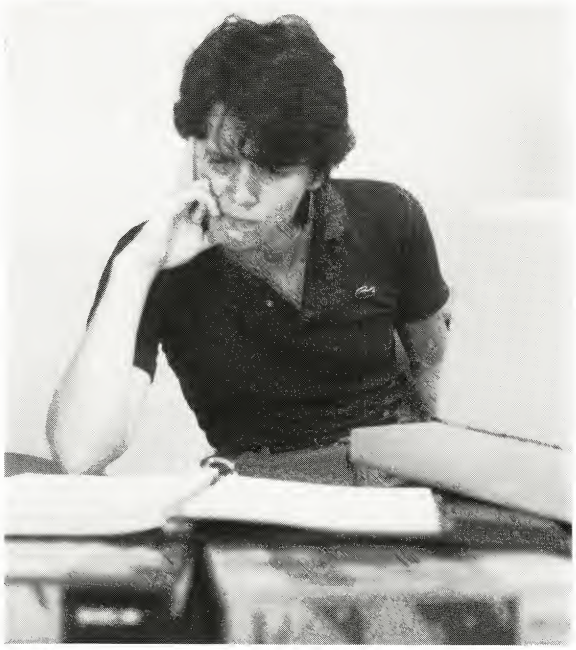

Photo by Charles Floto

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If you're a novice, you've probably been mystified—both by your nice new Heath/Zenith computer and by the tons of "documentation" that you can read if you already understand it. If you're a more skilled user, you may have tried to help others—then your problem is finding the details you know are buried there someplace. Have you ever thought you should write a short introduction? As a novice, have you ever thought you needed one? If so, this article's for both of you.

Photo by Charles Floto

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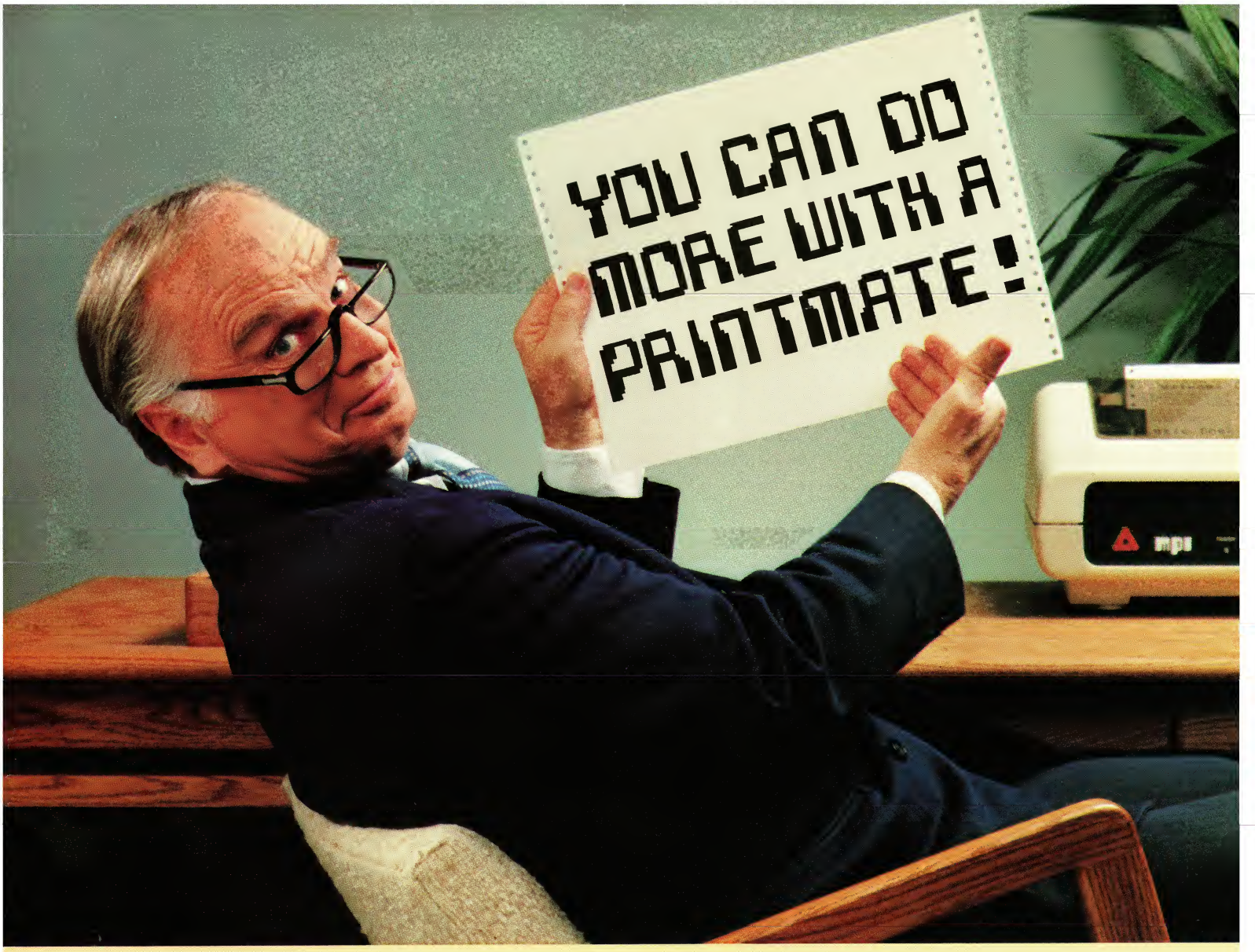
There sits a pile of 5¼" disks. The program you want is somewhere in that pile. And you don't know which disk it's on. Wouldn't it be nice if you had a single index for that whole mess? Well, now you can. For those who are perfectly organized and don't need such a crutch, this article takes a look at another case of organization: HDOS's directory structure. MBASIC and a machine-language routine do the job.



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The Editorial Eye

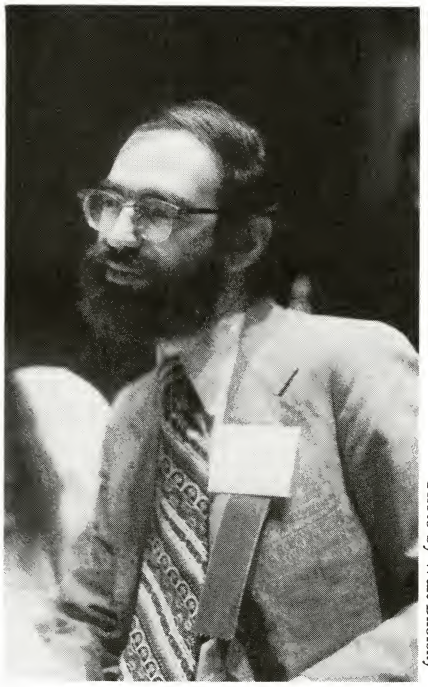

Photo by Walt Bilofsky

Zenith's Z100 series computers were described in the Summer 1982 *Sextant,* shortly after their announcement that June. They began to reach users last September. By December, some of these users had begun to announce software products they'd developed and were prepared to sell to other Z100 owners. Later, in the spring of 1983, the H100 series kit versions started shipping—also, the long-awaited Z100 technical manual.

Now, one year after the initial Z100 shipments, *Sextant* has our first opportunity for coverage of the Z100 based on the experience of users.

The Z100 software roundup represents what was available and known to us in May. Much more has been released since then—some of which we expect to be writing about for future issues.

This issue is a particularly good one in which to devote special attention to the Z100 series. Its publication coincides with the distribution of a low-profile Z110 to each of about 1,000 freshmen at Clarkson Memorial College of Technology in Potsdam, New York.

Special opportunities to obtain a Z100 computer have also been arranged at other colleges. Typically they give those at the schools involved a chance to buy a Z100 at a substantial discount. Some of the buyers will have access to loans for this purpose. Those with whom Zenith Data Systems has reached agreements include:

University of Wisconsin;
Elmhurst (Illinois) College;
Kansas State Board of Regents representing Kansas University, Kansas State University, University of Kansas Medical School, Wichita State University, Pittsburg State University, Emporia State University, Ft. Hays State University, and Kansas Technical Institute;
University of Southwestern Louisiana;
Tufts University (Massachusetts);
Plymouth (New Hampshire) State College;
Vermont State Colleges, including Castleton State, Johnson State, Lyndon State, Vermont Technical College, and Community College of Vermont (totaling 7,000 students);
University of New Orleans; and
Michigan Association of Colleges and Universities representing the University of Michigan and 12 state universities.

I hope this issue will help their students, faculty, and staff decide whether a Z100 computer is for them.

Speaking of colleges, you may have heard that a promising young actress and model will be attending Princeton this fall. We're happy to feature Vickie Saxon on our table of contents.

Charles Floto

Letters

Notes on HDOS STAND-ALONE

I would like to add a few clarifications to Charles Cohn's article about running in HDOS STAND-ALONE mode (*Sextant*, Summer 1983).

First, executing SET HDOS STAND-ALONE is not alone sufficient to get you into the STAND-ALONE mode; only upon DISMOUNT SY0: are the overlays permanently loaded.

Second, once HDOS STAND-ALONE has been SET, there is no need ever to SET it again; the modification obtains for that disk until SET HDOS NO-STAND-ALONE is executed.

Third, if the disk you use for SYSGENing a new disk has STAND-ALONE set, then the new disk will also have STAND-ALONE set. Thus you can go through life in STAND-ALONE mode without ever repeating the SET.

STAND-ALONE operation not only releases disk space, it speeds up disk operations, specifically MOUNT, DISMOUNT, and CAT. MOUNT SY0: is a lot faster than rebooting; for this reason I frequently run STAND-ALONE, though with a 400K SY1: I'm rarely pressed for disk space.

A convenient way to automate the startup procedure is to have a PROLOGUE file on your booting disk which loads the printer driver(s) and dismounts the booting disk. Then you can work away the rest of the day with nonbootable, STAND-ALONE disks.

Another way to expand free disk space is to steal sectors from DIRECT.SYS. Burt Hulland's REDUCE.ABS, available free via the HUG SIG on CompuServe, will liberate up to 16 sectors, as well as merging RGT.SYS into GRT.SYS to grab two more.

Yet another way to get a couple of sectors is to edit ERRORMSG.SYS; merely shortening one of the longer messages by a few words will free two sectors.

Jack McKay
Washington, DC

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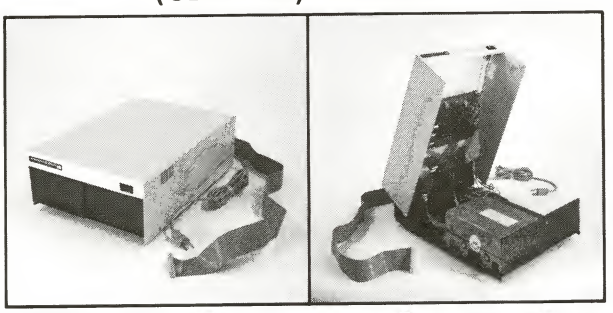

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Lucidata Pascal Addenda

Two addenda to my article on Lucidata Pascal in the last *Sextant*. (1) Somehow, obsolete prices lingered in the text after I thought I'd eradicated them. Believe the Polybytes ad, where Lucidata is priced (correctly) at $55 and TRANSLAT at $25. (2) My remarks about slow compilation amid frantic disk-banging should be emended to this extent: *if* you have a full 64K of memory (what HDOS calls 56K), and if also you have only an H17 driver mounted, you can enormously speed up HDOS compilation, and virtually silence it, by using RUNCOM instead of PRUN. PRUN in HDOS compiles in the slow and noisy "paging" mode. RUNCOM doesn't.

Hugh Kenner
Baltimore, MD

Magnolia Microsystems Specials

Received our Summer *Sextant* today and noticed the following:

The CP/M '83 article should have mentioned that CP/M '83 East will be held in Boston this September. Your readers may want to make plans to attend. We expect to exhibit our network there, for those customers who have not had the opportunity to see it yet. This product is currently shipping.

Hal Glatzer's article in the Summer issue correctly listed prices in effect at that time. We are (for the summer) including CP/M Plus at no charge with the 128K RAM board. We are shipping various double density formats (for both our controller and the Z89-37). Customers who previously purchased the 128K board should contact us for details. Additionally, since CP/M Plus comes with many programmer's utilities, we will be distributing BIOS *source* to allow the user to customize (and optimize) the product for their specific configuration. (It will not be as "user friendly" as MMS products have previously been.) Since *source* is provided, our support will be limited. Consultation (at our usual rates) will be available for those who need assistance.

K.L.C. Gjerding, President
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CP/M '83 East will be held at Hynes Auditorium in Boston, Thursday through Saturday, September 29 through October 1. For more information, call or write: Northeast Expositions, Inc., 822 Boylston Street, Chestnut Hill, MA 02167, 617/739–2000 or 800/841–7000.

Errors in "Gypsy"

I have just received my Summer issue of *Sextant*. As always it is a pleasure to read and quite informative.

In reading the article "Program Some Improbable Prognostications," I found a number of minor errors. One of the errors might not be considered so minor except for the type of program that we are dealing with.

I will list them in line number order.

Lines 360/370 and 380/390 are seen once each for each run of the program. Therefore, it is quite possible that the value of "I" might not be between 1 and 10 at line 400. If this value is out of range, control will fall through to line 560 acting as though "I" were equal to 1. This by the way is the only time circumstances allow lines 500/510 to ever be used.

Inserting a line 395, IF (I < 1 OR I > 10) THEN GOTO 360, is one of a number of ways to correct this problem.

Line 1090 is unnecessary; if "X" <> 1 then control will fall through to line 1100 automatically. However, the addition of a line 1095,

PRINT CLS$:GOTO 1010, will do it very nicely. This will catch input errors of values other than 1 or 2.

At no time are lines 990/1000 ever seen when the program is executing; they can be removed. All of the GOTOs following the printing of a fortune direct control to line 1010, including the GOTO following "I" = 10, which bypasses lines 990 and 1000.

I don't mean to pick on the efforts of the two writers; however, it seems as though they didn't really test the program carefully. Yet, it's a fun program so maybe that's the reason. In any case the program makes a good party game either for children or adults. Just place the correct types of fortunes based upon the age group using the game.

Bob Kaplan
Brooklyn, NY

We ran GYPSY.BAS here before printing it and it worked without a hitch. The remarks for lines 370–390, however, are misleading. Basically, the "I" produced by line 390 will be in range for lines 400–490, or will "fall through" to line 500 and the first fortune. This is because RND(1) in line 390 will always be between zero and one. (We might also note that GYPSY.BAS, like "Battleship" in this issue, was written for Microsoft BASIC under CP/M using the RANDOMIZE function unavailable to Microsoft BASIC under the Heath Disk Operating System. Those who wish to use it under HDOS might look at the patch given for "Battleship.")

InfoWorld and *Byte* Ignore Heath/Zenith

Regarding the mention of "Melen's Law" in the Summer *Sextant* ("Scuttlebutt"): I also computed the superiority of the Z100, and sent the results to the *InfoWorld* editorial staff shortly after their article appeared. They did not publish any of it. Along a similar vein, *InfoWorld* recently solicited material regarding "obsolete" or "vintage" computers. I submitted some information on current uses of the H8 (as a "vintage" machine). When the Obsolete Computer article appeared, Imsai, Altair, TRS-80 M1, and others were mentioned, but not a word on the H8. My *InfoWorld* subscription is now up for renewal, and I fully intend to give them the same acknowledgment they are giving our machines. *Byte* is another that chooses to ignore the merits of Heath/Zenith; I have consistently chosen to ignore them, as well. Other Heath/Zenith owners may wish to do the same.

Rick Lutowski
San Jose, CA

On Installing the R. P. Board

Regarding R. P. Enterprises' Auto-Rep-89 (Summer issue of *Sextant*), I'm one of those who had a "newer cabinet" and an "older board," as noted in the article. So the two didn't fit. I would have phoned the company to see if they had another size board available, but they don't publish a phone number, one of the things I think every company in this business should do. Also, prior experience had shown that it took over two weeks for R. P. to respond to a letter, and I didn't want to wait that long for an answer.

So I solved the fit problem by removing part of the plastic lip inside the cabinet. Since the dust from using a saw could have done considerable damage to the computer, I used a soldering iron (to melt the plastic along a groove I inscribed) and a knife and pliers (to remove the excess plastic which built up along the groove). The entire job took about an hour. I'm glad to hear that R. P. has solved this problem with a new board design, but I wish they had published a phone number so I could have contacted them to inquire about such a possibility when I found the board they sent me wouldn't fit my computer.

There are a few other comments I would like to add to Mr. Thompson's article, mostly in areas which could be considered "product support." In addition to being unable to reach R. P. by phone, they don't respond very well to letters. Prior to

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ordering my Auto-Rep-89, I wrote them a letter asking several questions about their product. It took over two weeks to get an answer and all they sent me was a standard brochure. None of my "non-standard" questions were answered. This failure to be responsive to customer inquiries made me a little nervous about placing an order. I don't like dealing with companies which are only available by (slow response) mail and which don't answer some of the questions asked.

To give credit where credit is due, there was one noteworthy positive feature in R. P.'s installation instructions. This was a warning which more device suppliers should use (whenever appropriate), but usually don't. R. P. warns that seating the connector will take "more than normal force." That information was very helpful. Otherwise, there would have been a natural tendency to think something was wrong, and discontinue attempts to complete the installation. When instructions tell you extra force is required, you know it's appropriate. R. P. Enterprises won a plus point for that one.

They lost points on the rest of the instructions, however. Several things were omitted, such as instructions regarding how to remove the protective foam covering from the connector leads and some of the mechanical steps necessary to get at P301. The omissions were not serious, just annoying.

The final comment has to do with a jumper on the PC board which enables choosing between a 0.3- or 0.5-second time delay before the repeat function is activated when a key is depressed. The Auto-Rep-89 board came assembled with the jumper soldered to the 0.5-second position. The instructions tell you that you can change the delay by cutting the jumper wire at the 0.5 position and resoldering it to the 0.3 position. However, the jumper wire is too short to do this.

Since I wanted the 0.3-second delay, it was necessary to unsolder the jumper wire and insert a new one. As most of us who have assembled electronics know, it is a lot easier to solder a lead *into* a PC board than to *remove* one. It would have been much easier if R. P. Enterprises had just left one end of the jumper wire unsoldered and let the buyer make one simple solder connection (or if their ad told you to specify which time delay was preferred when ordering).

Once installed, the Auto-Rep-89 performed very nicely. Just the improvement in efficiency in cursor movement alone is remarkable. I wouldn't give up the capability it adds to my H89. But I had to put up with several minor problems and the one major problem (of fit) to get it installed.

My recommendations to R. P. Enterprises would be: (1) publish a phone number; (2) be more responsive to written inquiries; (3) redo the instructions to include *all* the steps, not just some of them; (4) leave one end of the jumper wire unsoldered and/or ask buyers to specify preferred time delay when ordering; (5) sit back and take in the orders.

Frank W. Smead
Clifton, NJ

On the subject of telephone numbers, the following appeared in the editorial in Sextant *#1:*

"Speaking of ads, you'll see many in this issue which are available in no other publication. The enterprises they represent vary quite a bit in size; some are well-established and some are part-time efforts. Some of the vendors serving the Zenith marketplace haven't yet achieved such trappings of legitimacy as a daytime phone number and membership in the local Chamber of Commerce. Many of the products represent excellent values because they aren't expected to support such overhead."

Correction

The photograph of the R. P. Enterprises auto-repeat board on page 79 of the Summer, 1983 issue was incorrectly credited. The photo was provided by Kirk L. Thompson.

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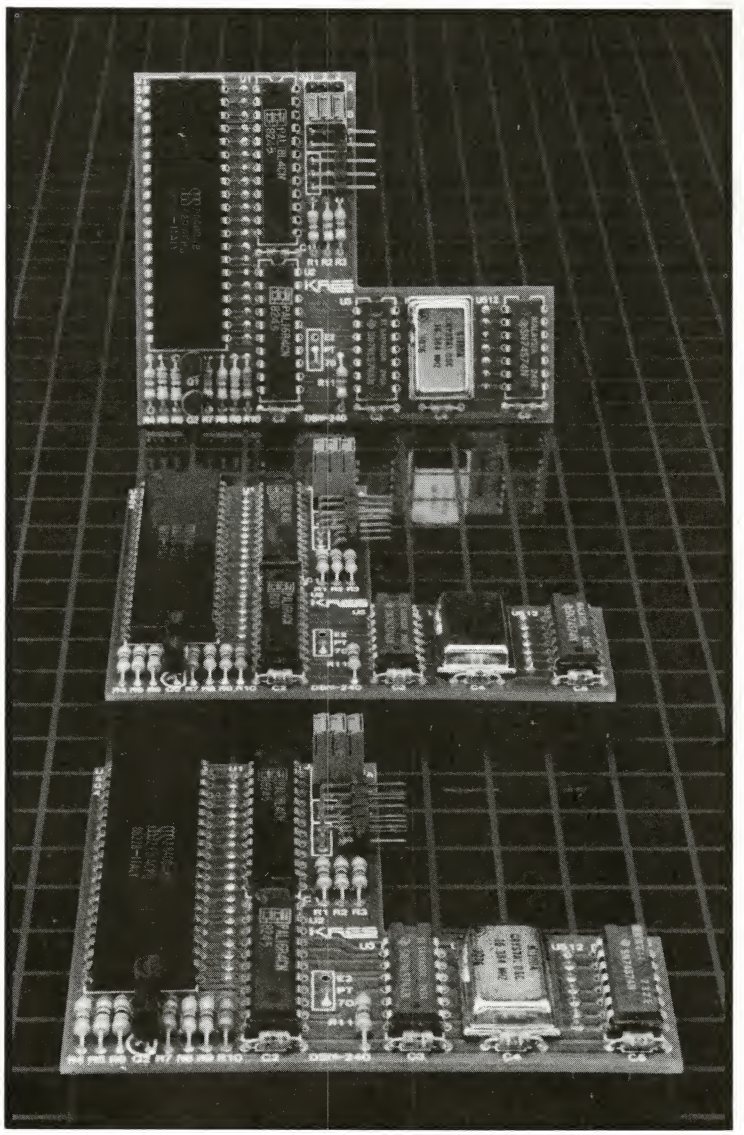

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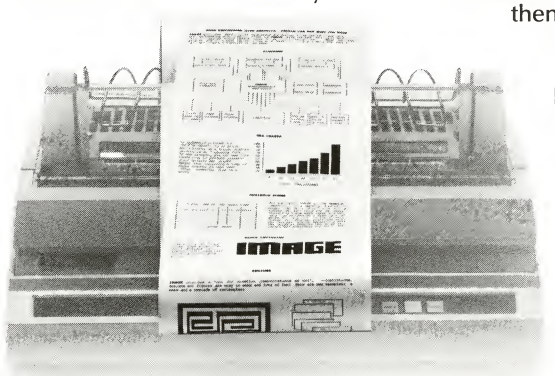

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All quotes are from InfoWorld's *IMAGE* software review, by Marty Petersen, June 14, 1982.

Circle #136 on Reader Service Card

dBASE II Comes to Heath/Zenith

dBASE II is one of the most well known data base management systems available for use on microcomputers. One user evaluates its capabilities here.

Wayne Rash, Jr.

I should probably state right at the beginning that after several months of using Ashton-Tate's data base management system, dBASE II, I have become a firm believer in its usefulness for many business applications, as well as for many other uses.

Most businesses, as well as most professional activities, revolve around some sort of data base. The information that makes up such a data base can be the inventory of a wholesaler, the client list of an attorney, a mailing list, or some other collection of facts to which the business needs frequent access in order to function well. Often these collections of information are processed in the office computer through the use of inventory programs, mailing lists, check registers, and ledgers; or on paper using written versions of these and other items such as appointment books. Or the office can combine these many functions into a single data base management system. A properly written and operated data base management system (DBMS) should allow users to enter the data they desire in a convenient manner; it should allow them to access it quickly and with a minimum of fuss; and it should permit the information in the data base to be acted upon easily to reflect the day-to-day activities of the business. dBASE II does all of this and a great deal more besides, and it does it very well.

dBASE II is a data base management system written by Wayne Ratliff of Ashton-Tate in Culver City, California. It runs on an H/Z89 with 56 kilobytes of random-access memory (RAM) running under the Heath-formatted version of the CP/M operating system, as well as on most 48K CP/M systems. I have been assured by H8 users that dBASE II will run on an H8 as well, but I have not tried to do this. While two drives are not required to make dBASE II work, a two-drive system is recommended. (dBASE is big; on disk, it takes up 67K, including "INSTALL" and "READ.ME".) Neither is a printer required, but one is necessary in order to use dBASE II to full advantage. A hard-disk system can be used and in many cases that may be the only way that the complete capabilities of dBASE II will ever be utilized.

dBASE II is a very capable system. Over 65,000 records are permitted per data base file, and when indexed any of these records can be accessed in about two seconds. Each of these records can contain up to one thousand characters. Each of the fields in the record can contain up to 254 characters, and there may be as many as 32 fields per record. Ten-digit accuracy is available to those who need a mathematical capability. Usually, the limiting factor in the size of the data base is the capability of the hardware rather than dBASE II.

dBASE II is delivered on four 5¼" hard sector disks containing a demonstration disk, the system disk sealed in a plastic envelope, a disk of sample programs, and "ZIP", the screen- and printer-formatting program. You have thirty days to try the demonstration disk before you decide to keep dBASE II. Once you open the sealed plastic envelope, the program is yours. Until that time, however, you are free to experiment with the demonstration disk to see if you like the system. If you decide that dBASE II is not for you, your money will be refunded. The demo disk is identical to the main disk except that you are restricted to not more than fifteen records per data base. This is ample to try out dBASE II, and the files you set up on the demo disk can be transferred to the main disk when you start using it. Along with the pack of four disks comes a loose-leaf binder containing approximately 400 pages of documentation.

The documentation package is divided into two parts. The first is an introduction to the use of dBASE II. Portions of this introduction are in the form of a tutorial. The second part is a more formal documentation section. At the end of the introductory part are listings for a complete working accounting system for a small business. The programs contained in this section can be modified to fit individual circumstances and otherwise typed in and run as they are. Additional programs and documentation are included on the sample program disk as well.

The whole package is extensively indexed and cross-referenced, and for the most part each of the functions is well explained. While reading the manual is never high on the list of initial activities when a new software package is received, I strongly recommend that at least the beginning of the manual be read before you try to run the first program. The user who is new to computers will probably find the manual tough to use at first. But with use, the cross references make it easy to find the information being sought. (Some critics have commented, though, that understanding it once you find it may be another matter.)

Starting up

After reading the introductory section at the beginning of the manual, and if necessary making any changes and updates to it, you are ready to run dBASE II. First, however, you must customize the program to the '89. This is very easy to do. You load the demo disk—or the main disk if you've decided to keep the program—and type "READ.ME" which tells you some additional start-up information and tells you to make two copies of dBASE II if you have not already done so. dBASE II is not copy-protected, and Ashton-Tate very strongly encourages that the distribution disks be stored and only used to make more copies of dBASE II. Once the copies are made, you insert one of them into the disk drive, wait for the A> prompt and type "INSTALL". The installation program greets you with a menu listing 20 popular terminals and microcomputers, one of which is the H/Z89. After you have indicated choice "C" on the menu to tell the program that you have an H89, you are asked to pick a symbol to use for macro substitutions. These macros play an important role in some command files, by allowing the contents of a memory variable or a field to be read

and acted upon as if they had been typed into the program.

The default choice for the macro symbol is the ampersand (&), and unless this would conflict with your word processor in some manner, it should be chosen. After you choose the macro symbol, you are asked whether or not you want the dialogue which is used in error correction. This dialogue is one of the nice points about dBASE II, and I recommend using it unless you have a specific reason not to. (Without the error-correction dialogue, you simply type in the line again completely. But then you have no way to trap any syntax errors that may sneak in.)

That ends the installation, and once you tell the system to go ahead with the installation, you are ready to start running dBASE II.

Bringing up dBASE II couldn't be easier. You simply type "DBASE". The system asks you for the date, and you can either enter a date or skip it by pressing "ENTER". Since the date can be used directly to print on reports or other documents, it is not wasted motion—as it is with most programs that request a date and then don't let you do anything with it.

Setting up your data base with dBASE II is fairly painless. You type "CREATE", the system asks a name for the data base, and you begin to tell the system the names for each field and the characteristics of the fields. To do this you enter the name of the field followed by the type of field, the length of the field, and the number of decimal places for each field, if applicable. You are allowed to specify three types of field: character, numeric, or logical. A character field contains any alphanumeric character including numbers. A numeric field should be used when mathematical operations on the data in the field are contemplated. The logical fields can contain "Y", "N", "T" or "F". If you choose a numerical field, you can specify the number of places that fall to the right of the decimal point, if any. In each case except the logical field, the length can be anywhere from one to 254 characters.

Once you complete the specifications for your data base, you press ENTER twice, and the system exits the "CREATE" mode. You are then asked if you wish to enter data at that time. If you have your data handy and want to start, you type "Y" and are presented with a reverse video layout of the fields you just specified, ready to be filled in. If you prefer, you can wait by typing "N" and the structure for your data base will be saved on disk until you are ready to enter data.

There are two features that make entering information into the system convenient. You may carry information over from one record to the next record if you wish. If many of your entries have the same information, this can be a real timesaver.

While you are filling out the fields for the data base, the cursor automatically skips to the next field once you have completed the previous one. This saves a lot of time in the case of fields of common length, such as ZIP codes and phone numbers.

It is only after all the data are finally entered that a DBMS finally begins to pay its way. Up to this point, dBASE II has been easy to use, but unremarkable. It is in the flexibility of use and the ease of asking for data that the differences show up. dBASE II, after all is a *relational* data base. With it, you can establish relationships involving any or all of the fields in your data base.

For example, a typical information request in dBASE II would be typed as follows:

```
LIST FOR NAME = 'Jones' .AND.
   CITY = 'Jacksonville'
```

or possibly:

```
DISPLAY FOR DEBT > 100000
   .AND. ASSETS < 1000
```

as an example of the system's ability to handle relational operators.

Once the data are set up, you may also generate printed reports using the "REPORT" command. This gives you the option of listing all or some of the

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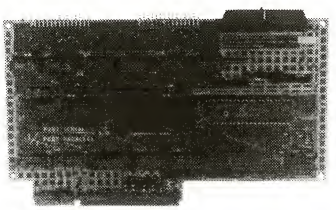

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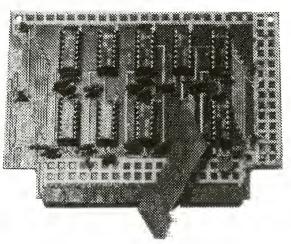

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information in tabular form, complete with column headings, a page heading, totals and subtotals. Once you type in the command, you are presented with a menu that asks you for specifications for the report you wish to generate. Once you have set up the format the first time, you will get this report each time you type "REPORT" and the name of whatever report you want to be run. If you wish, the data base that you've just created may be indexed on the basis of up to five different fields. This gives you the file listed in either numeric order or in alphanumeric order, depending on the field chosen. While this is not an actual sort, it serves the same purpose. And it allows the use of the "FIND" command, which allows access to any record in seconds, even in a very large data base. To do this you type:

```
INDEX ON [FIELD] TO [INDEX]
```

where the field is the one you want to put in order, and index is any name you chose for the index file. Once you have the file indexed, you find a specific record by typing:

```
USE [DATABASE] INDEX [INDEX FILE NAME]
FIND [ITEM]
```

In this case, the data base is the one you set up earlier and named at that time. The index file name is the one you chose when you indexed the file. The item is anything that may be in the field you indexed. For example, if your data base was named "Bills" and it was indexed to "Creditor" on field "Name", you would look up how much you owed your favorite computer store by typing:

```
USE BILLS INDEX CREDITOR
FIND "HEATHKIT"
DISPLAY
```

And there, even faster than good old Jerry down at the Heathkit store can ring up a sale, you would know how much you actually owe on all that computer equipment you bought.

Needless to say, much more complex indexes can be set up, for example:

```
INDEX ON [FIELD1]+[FIELD2] TO [INDEX]
```

will give you an index on two fields. Let's

Learning to use dBASE II

It's fairly easy to be intimidated by a system of programs as extensive as dBASE II. To the beginning user, the capabilities of the system, and the thought of having to read a 400-page manual—even if it is well done for the knowledgeable user—are enough to cause many to shy away from this system. Well, no longer do you need to be overwhelmed by dBASE II. Several vendors—Ashton-Tate among them—have developed training aids for dBASE II, in order that new users can make the most of their systems from the first.

The easiest to use of any that I have seen is in the form of a one-hour audio cassette produced by Micro Instructional, Inc., of Fort Lauderdale. The package is available for $29.95 from Heathkit Electronic Centers, and possibly from other computer stores as well. This tape starts the user off with the absolute basics, and never really gets to the point of teaching the user how to write programs. It does well at its intended purpose of leading the new user by the hand through the beginnings of setting up and running a database under dBASE II. I found the process painfully slow, but then I've been using dBASE II for some time. I let two people who had never encountered the system before listen to the tape, and their remarks were very positive. I will say that the tape covers its subject very clearly, and leads the user through each step, even to the extent of spelling out the commands when they are mentioned for the first time.

Upon completion of the tape, the new user is able to perform basic operations with the database. That is, the data can be entered and retrieved at will, and a few other simple commands can be carried out. Micro Instructional also lists a more advanced tape on dBASE II, but I have not found a copy of it.

The more advanced user will find some help in the form of the *dBASE II User's Guide* published by the Software Banc of Arlington, Massachusetts. This 133-page book costs $29 and is available from the publisher and from a few Heathkit Electronic Centers. Although it is also aimed at the first-time user of dBASE II, the *dBASE II User's Guide* covers the basics fairly quickly, and continues into some fairly advanced topics. At the very beginning of the book, the author, Adam Green, says that he does not intend to cover every possible command and function available in dBASE II. He does cover most of the most important points, and he does this quite clearly, starting off with a discussion of his first experiences with the system, and then leading the reader through programming in dBASE II, and interfacing with WordStar and SuperCalc. Much of what Green covers is also available in the manual; but he explains it in such a way that a less experienced user can understand it more easily.

Something that might be of interest to those who are already familiar with dBASE II is the *dBASE II Programmer's Notebook* by Steven Meyerson. This is not intended as a primer. Rather, it is a collection of hints and techniques that the author hopes will prove helpful to others like himself. It's available from CompuTech of Poquoson, Virginia and costs $12.95. (It comes with a mailing list program, S-MAIL, which is also available on disk for an additional $6.)

And there's also Ashton-Tate's own entry—*Everyman's Database Primer featuring dBASE II*, written by Robert A. Byers. This is a comprehensive book for the beginning user of dBASE II. If you are new to computers or are a little unsure of your abilities in using dBASE II, then consider this book. It is easier reading than the manual, and the organization is easier to follow. It is not a substitute for the documentation, since not all commands are covered.

Ashton-Tate also has a monthly magazine called *dNews* which is aimed at the dBASE II user. Originally published as a newsletter, *dNews* contains considerable information on programming, patches, and applications for dBASE II.

I should add that in spite of the fact that I have been using dBASE II for several months on a daily basis, I found new and useful information in each publication I've read. I would recommend the *dBASE II User's Guide* for any new owner of dBASE II, and the dBASE II tape for those who have very limited computer experience, or whose employees will be using the system, and have relatively little experience.

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Culver City, CA 90230
213/204–5570

```
USE GRAFIT INDEX LABNDX
STORE 0 TO YAXIS
STORE 0 TO XAXIS
SET FORMAT TO PRINT
@ 5,20 SAY "X-Y AXIS GRAPH"
STORE 10 TO XAXIS
DO WHILE .NOT. EOF

  @ XAXIS,0 SAY LABEL

  @ XAXIS,8 SAY CHR(233)

  STORE VAL(DATA)+10 TO YAXIS

  @ XAXIS,YAXIS SAY CHR(239)

  SKIP

  STORE XAXIS+ 1 TO XAXIS
ENDDO
STORE 8 TO YAXIS
DO WHILE YAXIS < 79

  @ XAXIS,YAXIS SAY CHR(232)

  STORE YAXIS + 1 TO YAXIS
ENDDO
STORE XAXIS + 1 TO XAXIS
STORE 10 TO YAXIS
STORE 10 TO RULER
DO WHILE YAXIS < 70
 @ XAXIS,YAXIS SAY RULER

  STORE YAXIS + 10 TO YAXIS

  STORE RULER + 10 TO RULER
ENDDO
RETURN
```

Listing 1: A typical dBASE II command file. In this instance, it is taken from a graph-generation program.

say you want to keep track of who you owe money to:

```
INDEX ON NAME+MONTH TO CREDITOR
```

You would then find the item you were looking for by typing:

```
USE BILLS INDEX CREDITOR
FIND VISA JUNE
```

And in two seconds, you would get the bad news about your June Visa bill.

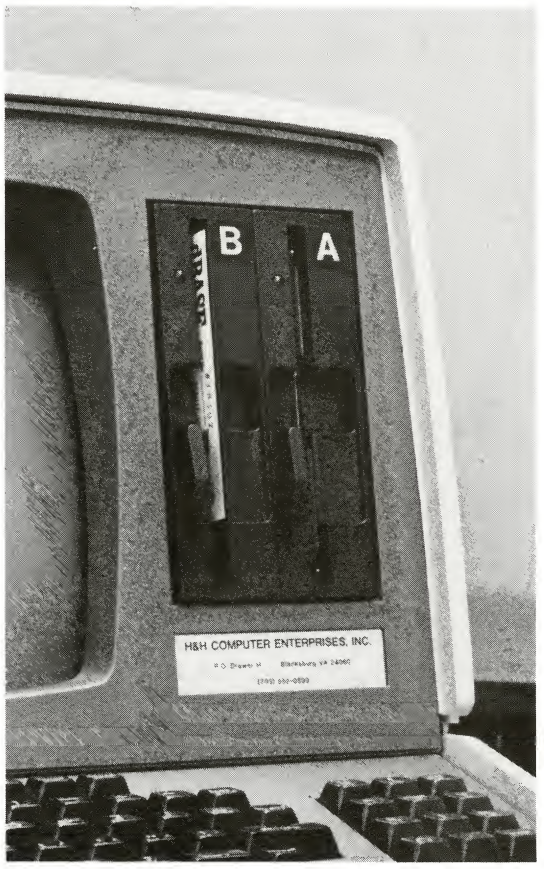
One of the strongest features of dBASE II lies in something other than being able to query the system for specific pieces of information. Even more important, you can write programs that run as a part of dBASE II. dBASE II uses its own programming language to allow automatic manipulation of the data. These instructions are called command files rather than programs, but they are programs in every sense of the word. The syntax and the words used resemble BASIC, and anyone familiar with that language should be comfortable. It is, however, a structured language whose appearance is much closer to Pascal than to BASIC.

Whatever you choose to call it—program or command file—it executes one command after another in a manner similar to BASIC. Most of the commands take the form of standard English verbs followed by some sort of modifier, and overall are quite easy to learn and begin using. The net result of all this is unlike other data bases I have used in that it allows you to run a series of commands that will take the data you have on hand and generate a summary of the information in precisely the manner you need. You are not forced to read through listing after listing and sort out the summary of the information yourself. A typical command file taken from an application I wrote as a part of a graph generation program shows you what to expect. It's found in Listing 1.

All this short program really does is take data from one field of the data base and plot it on an ordinary X–Y axis graph. Most of this particular command file is taken up with printer commands and drawing the outline of the graph. It does serve to illustrate, however, that a fairly difficult task for most DBMS programs can be performed easily.

It will be a rare user who uses this system of programs to its limit.

The command files are one of the major factors that make dBASE II considerably more useful than most other DBMS programs. While you as a user of a computer would not mind typing in a command and looking at your data base directly, you might have second



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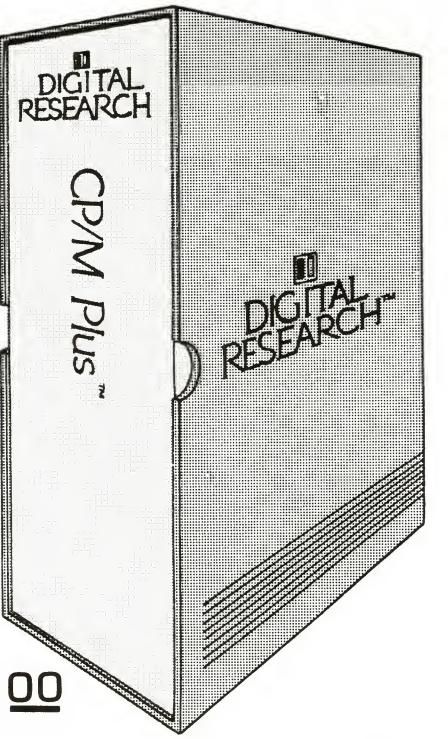

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thoughts about it in business. The command files allow you to set up your system so that it can be used by anyone, whether they are knowledgeable about computers or not. You may manipulate the data base directly, while your office workers are offered a menu allowing them certain choices at the touch of a key, and then having the manipulation performed for them.

There are two choices in ways to write a command file. Either you can use dBASE II's built-in text editor, or you can use a word processor such as WordStar.

Not-so-smooth text editing

One of the few real problems with dBASE II comes up with the text editor. You invoke its operation by typing "MODIFY COMMAND" followed by the name of the command file you wish to create or modify. If it's a new file, the system tells you that and then presents you with a blank screen marked with a reverse video line at the cursor location. You then type in the command file using standard WordStar-type cursor positioning, except that you use "CTRL-W" to save a file and "CTRL-Q" to abandon a file without making changes.

dBASE II does not make use of the special function keys on the H/Z89 terminal, so you are stuck with WordStar commands. If you find that inconvenient, though, there are programs available which will activate the H/Z89's

```
[USE SOFTWARE]
[GOTO TOP]
[SET TALK OFF]
[DO WHILE .NOT.EOF]
+-------------------------------------------------+
.                                                 .
.          Software Inventory Form                .
.                                                 .
.   Title: @TITLE          Location:@LOCATION     .
.                                                 .
.              Remarks:@REMARKS                   .
.   Source:@NAME                    @PHONE        .
.          @STREET                                .
.          @CITY          @STATE @ZIPCODE         .
+-------------------------------------------------+
[WAIT TO ACTION]
[SKIP]
[ENDDO]
```

Figure 1: The ZIP program is used to create screen displays. The items in square brackets are dBASE II commands that will become parts of a command file. They will not be displayed when the screen is finished.

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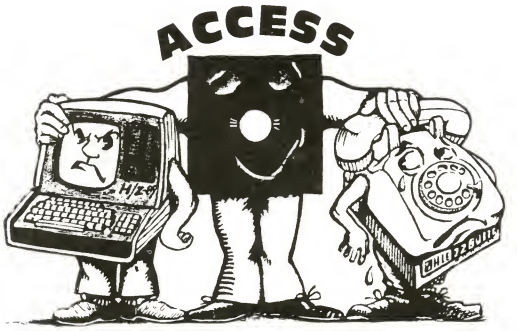

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keypad cursor controls for dBASE II, ZIP, and Fox and Geller's QuickCode. (Skill Data, P.O. Box 1943, Olympia, WA 98507. The package costs $29.95 from your local Heathkit store.)

For a new file, dBASE's editing works just fine. You begin to run into problems when you make extensive changes to an existing command file, especially when the disk is also nearly full. At those times, you are likely to have spurious data appended to your command file. After you change your command file, you then have to go back and clean out what you can of the garbage that found its way in. Unfortunately, the clean-out may introduce more garbage in the process.

The garbage does no harm so long as it appears after the command "Return" with which you end a command file. And you can usually get a usable file if you try; but it works a lot better to use a word processing program. I have spoken with the technical department at Ashton-Tate about this particular problem, and so far no sure-fire solutions seem available within dBASE II.

One way that some people have had good luck with is just to make sure they've got a completely clean screen before they start to modify anything. Type ERASE before MODIFY COMMAND—even though MODIFY COMMAND will erase the screen anyway. (One guess is that garbage from the previous display is hid away somewhere when MODIFY COMMAND clears the screen—then gets put in where you least want it.)

It's been my experience that this suggestion works for the random garbage. However, it does not seem to straighten up some other weird things MODIFY COMMAND can do—like bringing up the "BAK" file instead of the "CMD". I really wish this could be solved. It is not debilitating, but it is a problem in an otherwise smooth-running program.

Technical help

One of the reasons that the program is so smooth running is due to the efforts of the Ashton-Tate technical staff. To date they have been very willing to go into great detail over the telephone to assist in understanding an unclear point in the documentation, or to help in finding a solution to a new application, or in explaining the few bugs in the system. You should go to the dealer that sold you dBASE II first, but if they are not able to help, Ashton-Tate should be able to.

Things also run smoothly because the program helps you perform some of the more difficult functions. Two good examples of this are the "Report" function and the "ZIP" screen-generator. The "Report" function helps the user in setting up either printed or screen reports. The "ZIP" screen generator will also provide you with printed or screen reports, and in addition will provide screen designs for entering data to the system. The "Report" function is a part of the dBASE II system itself, while "ZIP" is included on a separate disk.

To use the "Report" function, you enter the dBASE II command mode, and at the dot prompt you type "REPORT". The system asks for a file name, and then responds with a series of questions regarding the report you wish to generate. You may specify a heading for the report as well as the heading for each column. The report may be double spaced if you desire and you may specify which fields, if any, will need totals and subtotals. As soon as all the parameters are set, you are presented with a finished report. If you want this report printed, you may do so.

If any of the items in the report had required it, a total would have appeared at the bottom of the appropriate column. You can run the "Report" function either directly or from a command file.

If the "Report" function does not do the job you want, there is also the "ZIP" program. You enter the "ZIP" screen generator directly from CP/M, after first installing it to meet the requirements of your particular computer. To do the installation, you type "ZIPIN" and follow the prompts. To run "ZIP" you type "ZIP" and wait for a menu to appear. You press any key after examining the screen, and are presented with a blank screen upon which to design your screen. At the bottom of the screen is a prompt indicating the line and column locations of the cursor. To create your design, you enter control characters to draw horizontal or vertical lines. You may indicate to the system which character you want to appear as the border of your screen or to form the lines making up the form. In addition, you may insert dBASE II commands on the screen, and the system will add these to the command file that is generated. A simple "ZIP" screen would look like Figure 1.

The items in the square brackets in Figure 2 are dBASE II commands that will become part of a command file when the screen is finished. You put them in square brackets to tell "ZIP" that these are commands and should not appear on the screen. The items preceded by the @ symbol within the form itself are to tell dBASE II where to display fields from the data base. When the screen appears on your terminal in use, it will be in reverse video, with the information blocks in normal video. Like "Report", "ZIP" may also be used to prepare printed reports.

As you continue to use dBASE II, you will find that "ZIP" and "Report" save you a lot of work, but at the expense of some flexibility. For this reason, dBASE II will also allow direct X–Y control of both the cursor and the printer. This will allow you to display your data in almost

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any manner you can want, including as bar and line graphs.

Conclusions

In conclusion, I have found dBASE II to be one of the most powerful and most effective microcomputer programs available from any source. Its capabilities are extensive enough that it will be a rare user who uses this system of programs to its limit. dBASE II is relatively easy for the beginner to use, and yet will allow the advanced user to realize his needs as well. There are bugs in the program, the most notable being the problem with the "Modify Command" function mentioned above. In addition, there are a few changes that would make the system even easier to use, the first that comes to mind being a "Help" command. I am told by Ashton-Tate that these fixes will come with new updates.

The most formidable obstacle to a new user is the necessity of learning a new programming language. Fortunately, this is really less of an obstacle than it appears, since the commands are in normal English for the most part, and the structure of the programs seems to be fairly logical. What is more important is that the novice user can start using dBASE II without learning to write programs, since the data base can be used directly through simple commands, and since the generation of screens and reports can be handled by the system itself with little knowledge needed on the part of the user.

dBASE II is ideally suited for business users. It runs well, and allows users to manipulate the data base in virtually any way they wish, as well as to generate new reports and perform new functions as new needs are discovered or as new requirements develop—something that more traditional business software cannot do without extensive modification. It is also ideally suited for the more casual user at home, although the cost may be prohibitive for most hobby users. One bright note here is that there appears to be considerable use of dBASE II as a loss leader by software dealers, so considerable savings are possible.

I would recommend this software to almost any business that uses a computer running CP/M or MP/M. If you have a Heath or Zenith computer, dBASE II will run on your 64K system very nicely, and in the process greatly increase your computer's usefulness.

dBASE II Update

I have had the opportunity to use a pre-release copy of the long awaited update to dBASE II version 2.3b, the subject of this review. I have found only one significant difference. The newer version contains a "Help" command. To use it, you simply type "Help" at a command prompt, and you will have a brief description of the commands printed on the screen. You may also specify which command you want help for, and information about that command will be displayed. This will reduce the amount of time spent looking up the proper command syntax in the book, since it can be found within the program. The explanations are not very extensive, and serve mostly as reminders.

A look at the disk directory will also show another big difference. dBASE II now consists of one very large COM file and a few overlays, instead of a small COM file and a great many overlays. This should speed up the program some, since fewer disk accesses will be required. Unfortunately, it also makes the program bigger than it was, leaving no extra space on a hard-sectored disk.

A few new commands have been added (e.g., Reindex), and some minor bugs have been fixed; but help has not arrived for Modify Command, it seems. That particular problem has yet to be resolved.

UTILITIES

NEW PRODUCT - UD.COM - A printer driver/spooler for CP/M 2.2. Adds universal printing capability to CP/M with unit numbers similar to UD.DVD. Also contains an interrupt driven built-in spooler that queues up to four files with multiple copies and optional titles and page numbering. Time shares your computer so you can print while using the computer for other tasks $39.95

SUPER SYSMOD2—This HDOS enhancement program adds many new features and commands to HDOS 2.0. Included are abbreviated commands (MOUNT SY1: becomes M1 for example) plus commands to: print files, print the disk directory, change the disk label, create batch processed commands, enable the terminal scroll mode, copy files that contain hard read errors and show the free disk space. In addition, the disk directory is alphabetic, file dates remain unchanged when files are copied and a new date switch is added. Also included is a powerful file manager command which presents disk files one at a time and gives a choice from 12 options to perform on the file including changing flags ... $29.95

SPOOLERS—Softshop drivers are now available with built-in spooling. Get all of the features of UD.DVD, MX.DVD or H25.DVD with a powerful spooler that has a built-in file queue manager which lets you add, delete, restart or abort files, produce multiple copies, pause or stop spooling ..... (Each version) $39.95

UD.DVD.—A truly universal device for printers. It will operate with virtually any printer through its settable handshake and format options. Using unit numbers (something like SY0: and SY1: for disk drives), one driver allows you to configure your printer to look like eight printers, each set for different format options. For example, with an H-14 printer, LPO: can be set for 10 CPI with left and right margins, etc. You can even have several printers operating at different baud rates and ports with just one driver. Seventeen options are settable for each of the unit numbers (136 total) and the HELP command will list the setting of each. Requires an H/Z-89 or H-8 with an 8250 UART (H8-4) $29.95

MX.DVD—A driver designed for the MX-80 family printers that offers setable unit numbers and a status help display similar to that of UD.DVD. some of the features include use of control characters to implement the more useful escape sequences, selection of desired handshaking mode and polarity, and a transparency mode for full graphics operation $29.95

H25.DVD.—A driver designed for the H/Z-25 printer which make extensive use of its features. Has the unit number and HELP capabilities of UD.DVD. In addition, control characters can be inserted in text files to produce subscripts, superscripts and double width, underlined and overprinted characters. $29.95

LANGUAGES

DISAS—A fast disassembler program that generates source code suitable as input to the HEATH assembler. Specify HDOS or CP/M $25.00

HFORTH-79—fig FORTH Ver 1.1 modified to include the full FORTH-79 standard plus many other features. HFORTH-79 operates under HDOS and makes full use of the HDOS file structure including named files for both program and data I/0. Additional features include a full screen editor with over 20 commands, and 8080 assembler. Requires an H/Z-89 or an H-8 with an H-19 ..... $34.95

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Unless notes otherwise, the above programs will work with H/Z-89 or the H-8 with 48K RAM minimum. They are available on 5 inch hard-sectored disks at most HEATHKIT stores or directly from SoftShop. Mail orders are sent postpaid in the U.S., First Class Mail. Overseas orders add $3.00. Payment must be in U.S. funds only.

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Unconfusing the New User

Most new users of computers are put off by mammoth manuals. One dealer has found that short introductory sketches—customized for the user's configuration—are helpful in getting over a novice's initial reluctance.

L. R. (Roy) Broun

A customer has just accepted delivery of a Zenith Data Systems "Desk Top Genius." I deliver three large boxes: the Z90–1 microcomputer, the Z37 disk drive, and a model 99G printer (from Micro Peripherals, Inc.—M.P.I.). Waiting in the truck are several imposing manuals: the Z90 manual, the manuals for the Heath Disk Operating System (HDOS); the SuperCalc manual; the manuals for the CP/M operating system; the manuals for Microsoft BASIC; and two folders of minifloppy disks and listings; not to mention miscellaneous boxes of necessary goodies (paper, address labels, vendor catalogs, instruction sheets, interconnection cables, junction box, etc.).

First Question (*Roy's Electronics*)—Where do I put everything? Or, more likely, anything? We need a computer typing position, shelf, cabinet, work surface, and table space for the drive and the printer. And where is someplace to plug in the junction box? (I learned very early that a five- or six-plug switched junction box/power strip is a necessity.) It would be very nice if the shelf were in the typist's reach but this is seldom feasible. Except that when I come back next week things will have been moved about to make it so.

Second Question (*Secretary*)—How do I turn this on? That one is easy: one switch on each piece of equipment, one switch on the junction box. We will turn all the equipment switches ON and use the junction box switch to power the system. (Taking care to see they put the junction box somewhere where the switch won't be accidentally hit and knock the system into oblivion.)

Third Question (*Business owner*)—If this is so easy to operate, why all these manuals? Well, they have information which you may need.

Fourth "Question" (*Secretary*)—I *won't* use this; it's too complicated.

Response: Plug the Z90 Desk Top Genius into the wall (or the power outlet), stuff a demonstration disk into SY0:. (I use Video Scribe—now titled Text Processor—and Touch Typist. Both are available from Newline Software of Littleton, Massachusetts.) Boot up, and go away for a cup of coffee (or, preferably, two martinis with the store owner). Nature will take its course: the bells & whistles will invite someone to accept the invitation and strike a key. And from that moment on someone will be hooked. Not only this, the compulsion is addictive and infectious.

How does a new user start out?

Many years ago, I learned that an introductory manual, instruction book, or guide that is over six to ten pages long won't be read. The decision "to read or not to read" is made before the cover is lifted and stays forevermore. Illustrations, comic strip characters, blank pages, and repetitious instructions don't help. If the basic guide can entice the "student" to look further, then manuals and reference texts can be as complex, as tastefully decorated, and as thick as need be. The decision "to read or not to read" is not affected by sneaky details in text preparation (printing on both sides of the page and using halfline spacing between paragraphs).

So I prepare a series of short, concise articles on each phase of the learning cycle for the Desk Top Genius. I have found shortcomings in the Heath/Zenith documentation at each phase of the development cycle. Authors of software manuals and hardware manuals seldom have to teach the material to first-time users.

Moreover, there are so many possible system configurations that describing how to use all of them is totally confusing. A usable system must have a printer; one can learn to use a microcomputer without hard-copy capability, but any business use demands printouts. Additional, "outboard," disk drives are also a necessity; it makes a tremendous difference to have the flexibility, additional data storage, and freedom from constant disk-swapping when running programs and making backup copies. Given the variety of choices, each of the guides is written for a particular customer's system configuration.

And certain warnings have to be attended to right away. It is all too easy, for instance, to damage a diskette hub with the Z37 drives. The cautions to use only premium quality disks with hub reinforcements and to have the drive running before closing the door are essential and cannot be repeated too often. Regular preparation of backup disks and the use of PIP *.* or some other disk duplication utility must be emphasized.

Why write a user's guide?

New users want to use their system immediately. It isn't that easy; some preliminary instruction is essential. I have found a great deal of useful and interesting information in the *REMark* magazine from the Heath Users' Group (HUG). But a new user does not have back issues of *REMark*; I have to fill in the gap.

I start customers with HDOS because it gives them some assistance in file directories and has a good series of error messages.

Page editors, though, are much easier to use than the EDIT.ABS line-editor program provided with HDOS; the sophisticated word processing editors are a learning experience in themselves. I employ two aids to surmount this barrier: Text Processor (formerly Video Scribe) from Newline and several game disks from my own library.

The first problem new users face is the lack of concise tutorials in the manuals. Even more significant is the difficulty in finding needed information. And when the subject area is found, one is often faced with a caveat which translates to "don't read this unless you already understand it." Part and parcel of the same attitude is the failure to reiterate essential "minor details." Once an instruction is given, it is seldom repeated. Three examples: the necessity to "type spaces to determine baud rate" after BOOT with a newly SYSGENed disk; how to get a line printer to provide hardcopy of CATalog listings; and that new names, expressions, or values are *always* to the left of the "=" sign. The full command is "LET X = Y"; "LET" is defaulted and not necessary. So "X=Y" is *not* the equivalent of "Y = X".

Office staff being introduced to a new concept are not hobbyists; they *do not* wish to learn all about the system. The less they must learn the more swiftly the

new gadget will be accepted. A detailed, step-by-step checkoff list (the "First Time Through" listings from the Heath manuals) must, of necessity, include instructions for INITializing or FORMATing the disks preparatory to use. Yet these turn off secretaries and parts-counter workers more swiftly than anything else I've encountered.

I provide the customer with FORMATted (or INITialized) disks and suggest that the manual be studied for the utilization of new or erased disks. It is enough to explain that if one is using CP/M as an operating system, someone must FORMAT the disks prior to use—and that the corresponding procedure under HDOS is provided by the INIT.ABS program on one of the original distribution disks.

What goes into a new user's guide?

Typical guide contents are "bootup" instructions for the specific programs provided, particular cautions as to how files and/or disks can be destroyed, and reassurance that only the information on media (disks) can be damaged from the keyboard (with specific examples as to what can be replaced).

I explain that the first thing one must do is to "BOOT" the system. And explain that the term comes from the use of "bootstrap amplifiers"—in which a working signal is generated by forcing a tiny initial signal to amplify itself. (Another parallel—in my youth I *booted* stubborn mules to get them started on a frosty morning.)

BOOT the system by typing "B"; the built-in firmware completes the word BOOT; hit "RETURN" (sometimes referred to as <CR>; also, "ENTER") and you are off and running. The signal has been given for the system to build itself into an operating entity consisting of a myriad number of switches aligned in the specific order required to make the computer operate.

A thorough discussion of CAT/CAT LP: commands and the use of wild card symbols is also important.

At first, it seems that every question as to what is contained on a disk can be answered by using "CAT" at the HDOS prompt. Soon, however, problems develop—as when I forget what I've just read; or if there is more on the disk than can be shown all at once on the screen's 24 lines.

First answer: use "CAT LP: = (device)" to provide a hard-copy listing.

Second answer: use the wildcard symbols with CAT to list only the files of interest. This also helps when many files are on the disk—which occurs very swiftly with the large capacity drives.

So I have to explain that the wildcard symbols, used with the CATalog command, are "*" and "?". And I give an example of wildcard use: I use three-letter month abbreviations as extensions for correspondence files. When I want to get all of November's correspondence, I type CAT SY2:*.NOV from the HDOS prompt. Or, if I want to find back correspondence to the *Sextant* editor, the command is "CAT SY2:SEX*.*". The CATalog listing returned in either case will include "SY2:SEX22.NOV".

There are other solutions; HDOS provides a "brief" catalog listing with the "/B" switch. This listing lacks much of the information provided by the HDOS CATalog command (dates, flags, file size, space remaining on the disk). If one is using CP/M, a similar listing is returned from a "DIR A:" command.

I have to discuss defaults and extensions thoroughly. The hardest concept to get across has been the format for the "fully qualified" file name and why defaults make the full file name unnecessary. Programmers—the system designers who originally conceived and wrote the systems—aren't typists. They will not write the full name of anything—they abbreviate. So we have "command completion" and system defaults.

Command completion is when the system writes the rest of the word after the first letter(s) have been typed. Default commands are assumed commands—they aren't needed unless something other than the default is

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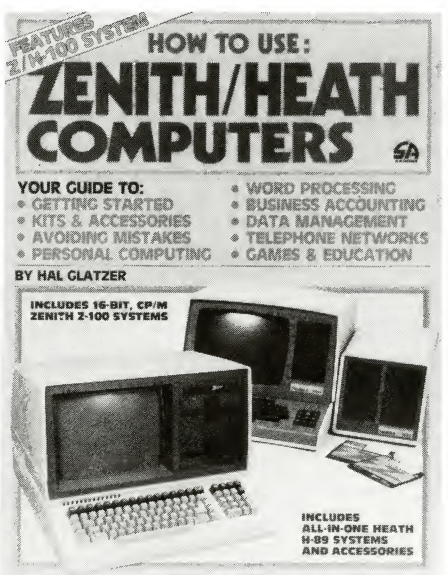

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desired. An example: HDOS doesn't need the command "RUN" to start an ".ABS" program. Why else would, or should, "INIT" be typed on the screen unless I want to order "RUN SY0:INIT.ABS"? Of course, if the program to INITialize disks is mounted on SY2: then HDOS will beep and remind me.

Once a system has been booted, the Desk Top Genius reads certain signals from the boot disk, responds in a predetermined manner, and ends up with the signal to the operator that everything is up and running—in HDOS, this is the ">" prompt.

Filling in where the documentation is silent

The next problem area facing new users is that of undocumented commands and procedures. There are a number of them that are handy: "STAND-ALONE" procedures; the "IGNORE" command; and the /JGL and the /ALL switches for CATalog commands. All of these should be covered for HDOS users.

I don't understand why these commands aren't covered in the Heath/Zenith documentation. "STAND-ALONE", where certain system programs are held in memory, is highly useful for single-disk drive operation. [See Charles Cohn's article on STAND-ALONE operation, in the Summer 1983 issue of *Sextant*.] Although one really can "fall into a pit."

I point out that it is ordered from the SET command: type "SET HDOS STAND-ALONE". Certain system files from the boot disk are then held in memory so that SY0: can be RESET and a new disk inserted—useful when the system volume (bootable disk) is nearly full and it is necessary to use a non-bootable disk in SY0:. To cancel STAND-ALONE, the command from the HDOS prompt is "SET HDOS NOSTAND-ALONE".

STAND-ALONE is also useful with a two-drive system. It enables you to use PIP.ABS to copy backup files onto a fresh disk where both disks are non-bootable. The first time you try this, HDOS tells you that you can't get there from here. So you go to STAND-ALONE. You have to order "PIP" from the system disk; then order "SY0:/RES"; follow instructions by inserting an INITialized blank disk in SY0:, replacing your system disk. And then type "SY0:*.* = SY1:*.*". (Yes, I have to warn my readers to *be careful*—if you goof and invert the sequence you may find nothing on SY1:. Or, as I have done on occasion, you will exchange old data files for the newer material you wish to save.)

"IGNORE", ordered instead of "BOOT", will force the system *not* to read or follow the instructions on a "PROLOGUE.SYS" file. Many customized program disks have a series of instructions incorporated into an absolute file named "PROLOGUE.SYS". HDOS looks for this file after the boot disk is mounted. If it exists on the boot disk, it follows those instructions. The prologue is frequently meant to make the program easier to use by the less experienced, so there'll be times when you wish to dispense with it.

(As an aside: *REMark* #13, December 1980, has a nice program by Jay H. Gold usable as a prologue to generate turn-key systems. Excellent programs are offered by software houses that do the same thing in a smoother manner—but these programs are more likely to confuse a beginner than provide assistance.)

The "/JGL" switch, used with "CAT", substitutes for the "/S" switch and forces HDOS to CATalog all files including system files. (It also shows a "C" flag when the sectors for a file are contiguous.) "/ALL" is documented but not emphasized. It will CATalog the total number of sectors ALLocated to each file—as distinguished from those it actually uses.

I include a once-over-lightly on recovery of inadvertently DELETEd files. The fact that I can often (but not always) restore the directory is useful; even more useful is inspiring sufficient interest so that customers can do their own restructuring. But the reference material is scattered between old issues of

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REMark, HUG utility programs, and my own experience.

When the Z89 monitor is changed to the Z90, several confusions arise. Strange and wonderful lines of text appear from the H: prompt when View is ordered. These are well documented *if* the customer can find the documentation. (It is in the Z90 monitor supplement and listing.) Some of the old users can't find that one. I well remember the two hours' study that I required to find the entry point for the internal memory test from the Z90 monitor "H:" prompt. (Entry is by typing "Test" from the H: prompt.) It should be emphasized to the user going from the '89 to the '90 that "Type spaces to determine baud rate" will no longer appear after "BOOT".

But don't think that a user's guide takes the place of the standard documentation—even for the novice. For instance, the MOUNT, DISMOUNT, ONECOPY, and PIP switches and commands cause some confusion. Here the best reference is the manual.

Some other things to consider

After these hurdles are passed (or ignored), there is the customers' learning experience in using a sophisticated editor. Such page editors as PIE and Video Scribe are much easier to use than Heath/Zenith's EDIT; of the two I find Video Scribe easier to teach and easier to remember. But additional instruction material is essential.

In drafting instruction outlines, I keep a cassette recorder running while I go through the office instruction. Questions should be covered in the outline; any questions on preceding material *must* be covered in revised outlines for the subjects questioned. Two pages (minimum) to four pages (maximum) covering that day's instruction are run off and provided. I ask that any questions or comments be noted on the instruction guide. On the next visit, I review notes—then correct and rerun as necessary.

By the end of the first office session with the Desk Top Genius, users should be working with some degree of facility with Video Scribe and the line printer, and have a demonstrated capability to identify files and call them up for use or for review. Here is where the games disk comes into play. It will be essential for those using the Desk Top Genius to get over any apprehension about using the keyboard and to be able to identify the distinction between .ABS and .BAS programs. A games disk is very useful at this point.

Haven't we all had this problem?

New customers are dismayed at the sheer volume of documentation supplied; more experienced customers are infuriated when they must look in three manuals to find out the answer to a single question. The interchange between hardware and software features are so subtle that all of us are, at times, confused. Any time you doubt this statement, try to summarize the setting of programming plugs, switches, and jumpers when expanding a Z89 with 48K memory to a Z90 with 64K memory. Everything is straightforward until you begin to study the explanations of the directions. By the time this is finished, technicians will find themselves using a DIP switch (a slide switch that plugs into an IC socket) instead of a cut programming plug in each of the drives; only after things respond as anticipated will they insert the plug. This "programming plug" is a sneaky gadget that looks like an integrated circuit—it has the same connections and plugs into an IC socket.

My pet peeve is the assumption in software documentation that "everyone knows *that*." If everyone knew all of the *that*s, there would be no need for texts or reference material. Example: where does the student find an explanation of the listing obtained from an assembler? The documentation passes by the concept of the first columns of numbers being the addresses and instructions, expressed in split-octal numbering; and that these can be entered from the H: prompt with an "S" command for a test run. Of course, everyone knows *that*. And there will be the time when the customer asks why this elaborate computer can't count beyond seven in octal or split-octal. This will lead to a digression into numbering systems and radix bases.

If one is trying to grasp the essential concepts of assembly language, things are even worse. Why are the instructions to load and use ASM.ABS in the middle of the chapter? Has anyone been able to get the first program of the Assembly Language Course ("TYPE MY NAME TEN TIMES") to run without considerable research? I oscillated between the course itself, old copies of *REMark*, Dr. William Campbell's short text on assembly language, and the examples in the HDOS 2.0 and 1.6 manuals. Finally things began to come into line—and then I got lost in the question of initialization of UART chips. After I asked several questions at a local HUG meeting, the light began to glimmer as I realized the differences between cold boots and warm boots; if one gives a hard reset from HDOS, the H: prompt can serve as the starting point without the necessity of going through UART initialization; since it will have been done by the monitor read-only memory (ROM) on booting up HDOS.

Of course, everyone knows *that*.

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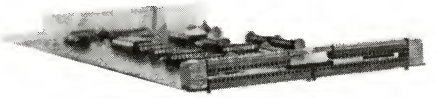

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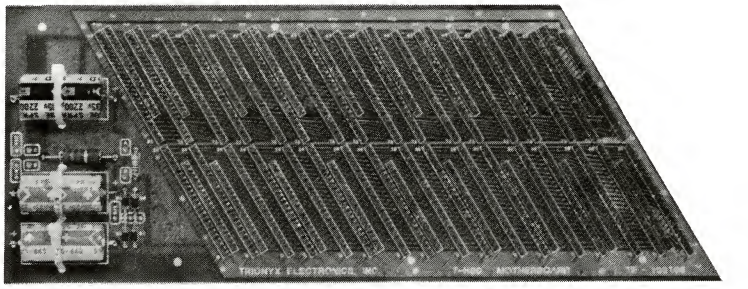

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Clair Doughty

Battleship is a guessing game to locate hidden ships. When you played it as a kid, you placed x's on graph paper to mark the location of your "fleet." So many x's for a battleship, fewer for a destroyer, and so on. But you didn't let your opponent see your map. Instead, each of you called out shots—graph coordinates. If your opponent's shot landed on one of your ships, you acknowledged the hit and your opponent marked it down on another piece of graph paper. From that information, you each tried to sink all the other's ships. If a destroyer, say, took up two x's, then two hits and it was sunk.

The game: you against your computer

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When used as a game, Battleship has become a teaching tool for my 4- and 8-year old daughters. They have learned to become familiar with both keyboard and screen and are able to find a location on a numbered board. It is a fun game, yet it develops a spirit of achievement and competitiveness in the participants. By the way, the lowest score for a winning game at our house is 33 shots.

A look at the program

I wrote the program to help myself become acclimated to the escape sequences used to control the terminal functions of an H/Z89. Some of the functions found in the program include: reverse video, direct cursor addressing, graphics, and the bell and clear screen. Reverse video is used to highlight the title, messages, and the score. The program was also useful in allowing me to practice designing a screen, setting up a menu, and writing directions for someone who had not previously used a computer.

Allow me to explain the various parts of the program. The 10-by-10 grid is drawn using characters in the graphics mode. Direct cursor addressing is used to print messages and the display at exact locations on the screen without scrolling the display. The cursor positions are numbered from 1 to 1920. By adding 80 for each row to the desired row and the number of columns to the position you want, the number will be from 1 to 1920. By assigning N equal to that value, and using the formulas at line number 1250, the cursor can be moved to any spot on the 24-by-80 screen. This routine can be used as a substitute for the print @ function in BASIC languages for other types of computers.

Line 140 defines escape code, clear screen, and graphics mode. Line 150

```
100 REM BATTLESHIP PROGRAM
110 REM BY CLAIR DOUGHTY, 302 GRISWOLD ST., ELGIN, ILLINOIS 60120
120 REM THIS PROGRAM USES H19/H89/Z90 GRAPHICS AND TERMINAL FUNCTIONS.
130 CLEAR
140 ES$ = CHR$(27):CL$ = ES$+CHR$(69):GR$ = ES$+CHR$(70)
150 RG$ = ES$+CHR$(71):RV$ = ES$+CHR$(112):VR$ = ES$+CHR$(113)
160 VT$ = CHR$(96):RT$ = CHR$(125):BL$ = "    ":BE$ = CHR$(7)
170 ML$ = BL$+RT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$
180 ML$ = ML$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+VT$+BL$+RT$
190 NO$ = "1"+BL$+"2"+BL$+"3"+BL$+"4"+BL$+"5"
200 NO$ = NO$+BL$+"6"+BL$+"7"+BL$+"8"+BL$+"9"+BL$+"10"
210 PRINT CL$:PRINT TAB(35);RV$;"BATTLESHIP";VR$
220 PRINT:PRINT:PRINT TAB(25);"PLEASE SELECT OPTION 1,2 OR 3!"
230 PRINT:PRINT:PRINT TAB(30);"GAME DIRECTIONS  -  1"
240 PRINT:PRINT TAB(30);"START GAME        -  2"
250 PRINT:PRINT TAB(30);"END GAME          -  3"
260 T$ = INKEY$
270 IF T$ = "1" THEN 300
280 IF T$ = "2" THEN 520
290 IF T$ = "3" THEN 1810 ELSE 260
300 PRINT CL$;TAB(35);RV$;"BATTLESHIP";VR$:PRINT
310 PRINT "This is a guessing game to locate the hidden ships. A map will be"
320 PRINT "drawn on the screen with numbers over each column and down each row."
330 PRINT "The description of each ship and its symbol will be displayed to"
340 PRINT "the right of the map for your information. The game will start by"
350 PRINT "randomly selecting the hidden locations for the ships. During this"
360 PRINT "time, a message will be displayed asking you to wait while the ships"
370 PRINT "maneuver. To the left of the screen, you will be asked your selection"
380 PRINT "for the columns with the prompt - OVER?. Please answer with a number"
390 PRINT "between 1 and 10 and hit the RETURN key. Next you will be asked your"
400 PRINT "selection for the rows with the prompt - DOWN?. Please answer with a"
410 PRINT "number between 1 and 10. If you locate a ship one of the symbols for"
420 PRINT "the ships will appear at the guessed location and a beep will sound."
430 PRINT "If you miss, an asterisk (*) will appear in the location. If you"
440 PRINT "pick a location that was previously chosen, you will see a message"
450 PRINT "to TRY AGAIN along with 2 beeps. The shots, hits, and misses will be"
460 PRINT "displayed for you. There are a possible 100 shots. You will be rated"
470 PRINT "by your score at the end of the game as the map is cleared of "
480 PRINT "asterisks to reveal the ship locations.":PRINT
490 PRINT "To start the game, press the S key":PRINT
500 A$ = INKEY$
510 IF A$ <> "S" THEN 500
520 PRINT CL$;GR$:PRINT TAB(5);RV$;"BATTLESHIP";VR$;TAB(23);NO$
530 FOR I = 1 TO 10:PRINT TAB(20)STRING$(40,97)
540 PRINT TAB(12)I;TAB(16)ML$:NEXT I
550 PRINT TAB(20)STRING$(40,97);RG$
560 FOR L = 302 TO 1102 STEP 80
570 N = L:READ CH$:GOSUB 1250:NEXT L
580 FOR L = 241 TO 561 STEP 80
590 N = L:READ CH$:GOSUB 1250:NEXT L
600 DIM A(10,10):DIM K(16)
610 FOR B = 1 TO 10:FOR E = 1 TO 10
620 READ A(B,E):NEXT E:NEXT B
```

Listing 1: The game "Battleship" for one player against the computer; written in Microsoft BASIC for use under CP/M.

defines exiting graphics mode, reverse video, and regular video codes. Line 160 defines graphics characters and the bell code. Lines 170 through 200 define character strings that represent part of the screen grid. Lines 210 to 510 provide the menu and directions.

The main part of the screen is created using lines 520 through 590 and reading data from lines 1650 through 1680. The grid locations, from data lines 1690 through 1780, are read into a table from lines 600 through 620.

The random selection of ship positions is determined by the sequence from 630 to 980. The ships are positioned horizontally or vertically at random from the largest—a carrier (CCCCC)—to the smallest—a PT boat (P). If a selected position is blocked by another ship or the edge of the grid, the selection routine tries to go backward to locate the ship. If this fails, a new random location and direction are selected until the ship is placed. The final ship locations are placed in a table to be accessed during the guessing part of the game.

The routines from line 990 to 1240 ask for OVER and DOWN coordinates, check for positions already guessed, and record hits and misses. Misses are displayed as an asterisk (*) and hits by the appropriate letter. An example would be (D) for a hit on a destroyer. All hits and misses are tallied in the upper left part of the display.

The routine from 1250 to 1360 figures the x-y coordinates used for direct cursor addressing (1280). Switches are in the routine to turn on reverse video and update and display hits and misses. To use the routine, set CH$ equal to the character string to be displayed. Also set N equal to the screen location from 1 to 2000. Next, GOSUB to the routine (1250). If the message (CH$) is to be displayed in reverse video and a bell is to sound at the same

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```
630 PRINT RV$;BE$
640 N = 1262:CH$ = "SHIPS MANEUVERING":GOSUB 1250
650 N = 1342:CH$ = "PLEASE WAIT":GOSUB 1250
660 RANDOMIZE PEEK(11)
670 FOR C = 5 TO 1 STEP - 1
680 FOR F = 1 TO 2
690 W = INT(RND*2):T = INT(RND*11)
700 IF T < 1 OR T > 10 THEN 690
710 B(F) = T
720 NEXT F
730 G = C:O = B(1):D = B(2):H = 1
740 FOR G = G TO 1 STEP - 1
750 FOR J = 1 TO 15
760 N = A(D,O)
770 IF K(J) <> N THEN 860
780 IF C = 4 THEN J = 6
790 IF C = 3 THEN J = 10
800 IF C = 2 THEN J = 13
810 IF C = 1 THEN J = 15
820 FOR J = J TO 15
830 K(J) = 0
840 NEXT J
850 GOTO 680
860 IF K(J) <> 0 THEN 930
870 K(J) = N
880 IF W = 0 THEN D = D + H
890 IF W = 1 THEN O = O + H
900 IF D = 11 THEN D = D - C
910 IF O = 11 THEN O = O - C
920 GOTO 940
930 NEXT J
940 NEXT G
950 NEXT C
960 PRINT VR$;BE$
970 T = 0:N = 1262:CH$ = "                    ":GOSUB 1250
980 N = 1342:GOSUB 1250
990 CH$ = "OVER":T = 0:N = 962:GOSUB 1250
1000 INPUT O
1010 CH$ = "      ":N = 1042:GOSUB 1250
1020 IF O > 0 AND O < 11 THEN 1040
1030 GOSUB 1110:GOTO 990
1040 CH$ = "DOWN":N = 1122:GOSUB 1250
1050 INPUT D
1060 CH$ = "      ":N = 1202:GOSUB 1250
1070 IF D > 0 AND D < 11 THEN 1090
1080 GOSUB 1110:GOTO 1040
1090 N = A(D,O)
1100 IF N <> 0 THEN 1140 ELSE GOTO 1030
1110 CH$ = "TRY AGAIN":N = 801:PRINT RV$;BE$:GOSUB 1250
1120 PRINT VR$:FOR X = 200 TO 1 STEP - 1:NEXT X:PRINT BE$
1130 CH$ = "          ":N = 801:GOSUB 1250:RETURN
1140 RESTORE 1800
1150 S = 1:T = 1
1160 FOR J = 1 TO 15
1170 READ CH$
1180 IF K(J) = N THEN 1210
1190 NEXT J
1200 CH$ = "*":S = 0
1210 GOSUB 1250
1220 A(D,O) = 0
1230 S = 0
1240 GOTO 990
1250 X = (N-(INT(N/80)*80)+1):Y = INT(N/80)+1
1260 IF S <> 1 THEN 1280
1270 PRINT RV$;BE$
1280 PRINT ES$;CHR$(89);CHR$(Y+31);CHR$(X+31);CH$
1290 IF T = 0 THEN RETURN
1300 C(1) = C(1) + S:C(3) = C(3) + 1:C(2) = C(3) - C(1)
1310 PRINT RV$
1320 FOR L = 321 TO 641 STEP 160
1330 M = (L - 161) / 160:N = L
1340 GOSUB 1370:NEXT L:PRINT VR$
1350 IF C(1) = 15 THEN 1400
1360 RETURN
1370 X = (N-(INT(N/80)*80)+1):Y = INT(N/80)+1
1380 PRINT ES$;CHR$(89);CHR$(Y+31);CHR$(X+31);C(M)
1390 RETURN
1400 RESTORE 1790
1410 T = 0:PRINT RV$;BE$:N = 1262:CH$ = "RATING :":GOSUB 1250
1420 FOR T = 25 TO 85 STEP 15
1430 READ CH$
1440 IF C(3) <= T THEN 1460
1450 NEXT T
1460 N = 1342:T = 0:GOSUB 1250
1470 N = 1502:CH$ = "CLEARING MISSES":GOSUB 1250
1480 N = 1582:CH$ = "TO REVEAL PATTERN":GOSUB 1250
1490 PRINT VR$;BE$
1500 RESTORE 1690
1510 T = 0:S = 3
1520 FOR B = 1 TO 10
```

```
1530 FOR E = 1 TO 10
1540 READ A(B,E)
1550 FOR J = 1 TO 15
1560 IF K(J) = A(B,E) THEN 1590
1570 NEXT J
1580 CH$ = " ":N = A(B,E):GOSUB 1250
1590 NEXT E
1600 NEXT B
1610 N = 1502:CH$ = "                    ":GOSUB 1250
1620 N = 1582:GOSUB 1250
1630 RESTORE 1650
1640 FOR Z = 600 TO 0 STEP -1:NEXT Z:GOTO 100
1650 DATA "CARRIER = CCCCC","BATTLESHIP = BBBB","DESTROYER = DDD"
1660 DATA "SUBMARINE = SS","PT BOAT = P"," ","NO. OF SHOTS = 100"
1670 DATA "MISS = *","HIT = C,B,D,S OR P","SHIPS MAY BE VERT."
1680 DATA "OR HORZ.","HITS"," ","MISSES"," ","SHOTS"
1690 DATA 260,264,268,272,276,280,284,288,292,296
1700 DATA 420,424,428,432,436,440,444,448,452,456
1710 DATA 580,584,588,592,596,600,604,608,612,616
1720 DATA 740,744,748,752,756,760,764,768,772,776
1730 DATA 900,904,908,912,916,920,924,928,932,936
1740 DATA 1060,1064,1068,1072,1076,1080,1084,1088,1092,1096
1750 DATA 1220,1224,1228,1232,1236,1240,1244,1248,1252,1256
1760 DATA 1380,1384,1388,1392,1396,1400,1404,1408,1412,1416
1770 DATA 1540,1544,1548,1552,1556,1560,1564,1568,1572,1576
1780 DATA 1700,1704,1708,1712,1716,1720,1724,1728,1732,1736
1790 DATA "FLEET COMMANDER","ADMIRAL","CAPTAIN","ENSIGN","SWAB"
1800 DATA "C","C","C","C","C","B","B","B","B","D","D","D","S","S","P"
1810 END
```

```
130 CLEAR 2500
260 INPUT T$
500 INPUT A$
652 RD=PEEK(8219)
654 FOR JK=1 TO RD
656 GB=RND(1)
660 NEXT JK
690 W = INT(RND(1)*2):T = INT(RND(1)*11)
```

Listing 2: A patch to enable Listing 1 to run in Microsoft BASIC under the Heath Disk Operating System. It gives the appropriate substitutions for lines 130, 260, 500, and 690 in Listing 1. Line 660 in Listing 1 is replaced by lines 652–660 given here.

time, switch S should be set to 1. To update and display the score, set switch T to 1. Lines 1370 through 1390 use direct cursor addressing to display the score table—C(M).

Line 1350 branches to 1400 when all the ships are sunk. The routine from 1400 to 1460 resets the data pointer and determines the player's rating in relation to the total number of guesses required to sink the ships.

Next, the board is cleared of misses (*) to display the final ship pattern. A message is sent from lines 1470 and 1480 informing the player of the action. The routine from 1490 to 1600 reads the ship location table and the board table to clear all locations that aren't contained in the ship location table.

Line 1630 restores the data pointer to the first data line. Line 1640 displays the final screen for a few seconds, then returns to the beginning menu for the start of a new game.

The program was written on a Z89 with Microsoft BASIC (MBASIC) running under CP/M. If you are running under the Heath Disk Operating System (HDOS), a substitute has to be used for the RANDOMIZE function since it's not supported by the Heath version of MBASIC. The appropriate changes can be found in Listing 2.

All comments are welcome. And let's hope that your hits and misses add up to a good score!

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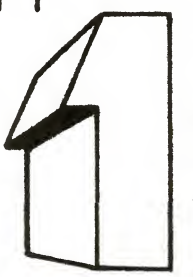

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Make Your '8 Think Like an '89—Only Faster

The Trionyx Z80 central processor unit can double your H8's speed and offers a larger instruction set than the original 8080 chip.

Clay Jackson

When the Heath Company set out to design the H8 in the mid-seventies, the Intel 8080 microprocessor chip was a natural choice on which to base the H8's central processor unit (CPU). The 8080 was the current "state of the art," technology stretched to the limit. Only a short while earlier, the mere thought of a 64-kilobyte computer system on a desktop was sheer fantasy. (Even the H8's designers didn't anticipate it.)

In computing more than anywhere else, though, technology moves fast. By the time the H8 was released, there were already systems available using the newer, more powerful Zilog chip, the Z80.

The Z80 offers several advantages over the 8080, not the least of which is the ability to upgrade to the Z80A, which will run at a clock speed of 4 megahertz (MHz) (or twice that of an 8080). The Z80 also has a larger instruction set (including block moves and compares) than the 8080. The Z80 also has an alternate set of memory registers—"A prime" through "H prime" (A'-H')—corresponding to the 8080's A through H registers. However, for all of its advantages, the Z80 remains almost 100% software-compatible with the 8080. So it seems logical now that there would be a number of replacement CPU boards available for the H8, including one directly from the Heath Company. While Heath's Z80 board runs only at 2 MHz, the others run at 4 MHz. This means that our existing 8080 programs will run (most without any conversion) on a Z80 system, at twice the CPU speed! (As an aside here, it should be noted that there are now versions of the Z80 that will run at speeds of up to 8 MHz.)

In early 1982, I set out looking for a Z80 CPU card for my H8. My selection criteria were really fairly simple: price, compatibility with my existing system, performance, and features. I examined literature and specs from Heath, D–G Electronic Developments, and Trionyx Electronics. What finally caused me to decide on the Trionyx board was the great luck I've had with their 64-kilobyte random-access memory (RAM) board—and with their replacement motherboard. (See *Sextant* #5, Spring 1983, for Thomas R. Sear's "Improve Your H8's Reliability: Install the Trionyx Motherboard.") Also, since I knew members of the CPU board's design team (Steve Bard, Tom Jorgenson, and Bill Perry), I felt fairly sure that the product would perform as advertised.

On December 3rd, I ordered the kit version of the board from Trionyx, at a cost of $250 (plus $3.50 shipping and handling). The kit arrived here in Washington state five days later, as promised.

It really isn't that difficult to construct and configure, but I don't think you can save the $50 price difference. I consider my time worth more than $1 per hour!

When I opened the kit, I found the usual thorough job of documentation, including: an assembly manual; complete parts lists and schematics; installation manuals for both the card and the new front-panel read only memory (ROM) chip; and a User's Guide for the FWZ80 front panel ROM. Also included with the package was a diskette containing the utilities to perform clock-speed selection running under the CP/M operating system and the Heath Disk Operating System (HDOS).

New features

Some of the features of the Trionyx board include: full support for the H8's front panel (including access to the Z80's alternate—or "prime"—register set); user choice of hexadecimal, split-octal or binary front-panel display; selectable processor "wait-states" to allow the CPU to twiddle its thumbs while dealing with a slower memory board; software-selectable processor speed (2 or 4 MHz); and support for "origin-zero" (org–0) of the programmable area of RAM.

There are over 100 wire-wrap pins on the board, used to select from a vast array of options. Finally, there are three DIP switches, which control the front panel ROM address, the number of processor wait-states, and the org–0 configuration.

Trionyx has also defined an additional processor status port that is used in conjunction with the speed routines to determine the current processor speed and number of wait-states.

Assembly

The actual assembly process is fairly straightforward, but *very* time consuming. I consider myself a fairly experienced kit builder, and it took me some 40 hours to assemble and check the board. There are some 50 socketed integrated circuit (IC) chips that must be installed, and probably an equal number of discrete components. Even with careful double checking, when I first installed the board I discovered a transistor installed incorrectly. Looking back, I would probably pay the additional $50 for the assembled version.

The most tedious part of the assembly and checkout process has to be the jumper-wire installation. There are over 30 connections that must be made, depending on your system configuration. This process can also be avoided by purchasing the assembled and tested version. The system may be configured for one of three separate front panel ROMs; it supports double-sided disk drives; and there are other features, as well.

The documentation here is a bit skimpy; while it provides enough information for configuring a "standard" system, there is little discussion of the various options available. I would have liked to see more information about some of the non-standard options.

Installation

Installation is also fairly straightforward, and is well documented. If you

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have not previously completed the org–0 modifications, Trionyx thoughtfully provides instructions on how to configure your system for org–0 operation.

If you have already made the org–0 modifications, installation involves removing the H17 ROM from the disk controller board and installing it in a socket on the new CPU board. In my case, I also had to re-dress the wiring at the base of the front panel, in order to allow for clearance at the bottom of the new CPU board.

Plug in the board, and you're ready to go! Well, sort of. When I plugged it in and nothing happened, I discovered one incorrectly installed transistor (my fault) and one incorrectly configured jumper selection (the documentation wasn't very clear). After I cleared up these two problems, I was up and away.

Operation

When the board is configured per the Trionyx documentation, it comes up in the 2 MHz mode. Running the memory test in the H17 ROM reveals no perceptible difference in speed from what it had been before. In fact, the only indication that the Z80 was installed was the hexadecimal display I'd chosen for my front panel. (No more split octal!) Running the SPEED utility provided on the diskette, I was able to switch to 4 MHz operation at will. When the board is running at 4 MHz, a light-emitting diode (LED) on top of the board is lit. The only disconcerting thing here was the ION LED on the H8 front panel. At 4 MHz, that LED remains off constantly. A quick check with Tom Jorgenson revealed that this is normal, and made me feel more secure.

A short note about speed is in order here. The architecture of the H8 is designed for a 2MHz clock speed. There are several items that should be considered when you upgrade your system. First, can your RAM keep up with the increase in speed? Some memory boards can't keep up without modification, or wait-states. Trionyx offers a modification service for their memory boards, for $50. Also, the Z-H8 allows the user to select (from software) 0, ½, 1, or 2 wait-states. This feature allows one to make use of slower memory boards, while still getting some increased throughput from the Z80.

The other big consideration is the motherboard. Since I purchased the Trionyx motherboard before I upgraded to a Z80, I have no first-hand experience with a faster processor in the original Heath motherboard; but my instincts tell me it probably would not work, due to design limitations in the older motherboard.

The SPEED utilities are provided for both HDOS and CP/M (both version 2.20.2 and 2.20.3), in source and object form. My only complaint is that the documentation for both the HDOS and CP/M versions of the utilities are only on the HDOS portion of the diskette! Since I normally run only CP/M, I had to dig out my old HDOS diskettes to get the documentation printed. A small complaint for such an otherwise excellent product.

Conclusion

Would I purchase this card again? Yes. Would I purchase the kit again? Absolutely not! It really isn't that difficult to construct and configure, but I don't think you can save the $50 price difference. I consider my time worth more than $1 per hour!

The card is definitely worth the price and I consider it a worthwhile addition to my already valuable H8. In the month that I have had the card installed, I have experienced no "glitches" or problems, and I really enjoy having access to all of the Z80 instruction set.

Ordering Information

Model Z-H8
Z80 CPU board for the H8
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Santa Ana, CA 92705
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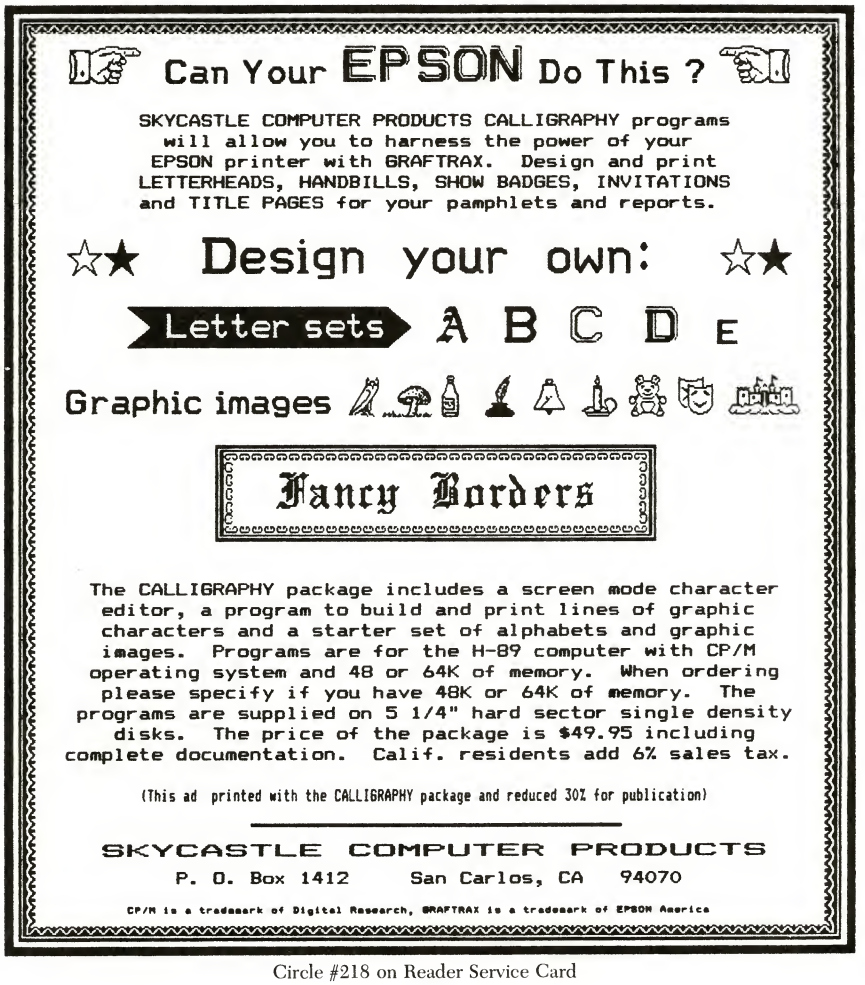
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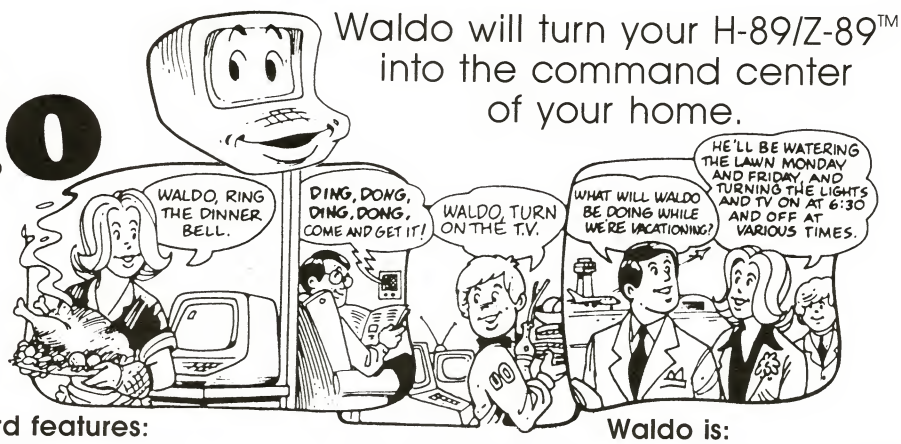
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Word Processing You Can Program

Spellbinder's ability to support precision printing needs is one of its major selling points.

Walter G. Jung

Owners of Heath/Zenith computers are a fortunate lot, in the sense that a number of extremely powerful editors and word processing packages are available specifically customized for their hardware. Just about everyone I know likes the nifty little PIE editor from The Software Toolworks, and deservedly so. However, as useful, fast, and efficient as PIE is as an editor, there are simply many functions it was not designed to perform.

In fact, we all probably have a favorite, lower-priced, editor that we like for small jobs. But, most of them will have some particular limitation. One will lack an insert/include function; some won't have disk-buffering for larger-than-memory files; another won't be able to do partial reads and/or writes. With some, you won't be able to create a series of commands to be executed as a single command; with others, you'll be able to create these macros, but not store them to disk. And, of course, on top of that list, we haven't even gotten into printing.

So to get more of the inherent power out of the Heath or Zenith computer, writers with heavy editing, formatting, and printing requirements can turn to a number of full-featured, albeit more expensive word processors for use with the CP/M operating system, as well as those running under the Heath Disk Operating System (HDOS).

This review covers one of the more flexible and powerful CP/M word processors, the Lexisoft Incorporated "Spellbinder" (a trademark of Lexisoft, Inc.). Spellbinder is available for the H/Z89, as well as for a number of other 8-bit microcomputers running CP/M-80. For those of you sporting the very latest from Heath/Zenith, it also comes in 16-bit CP/M-86 and Zenith Disk Operating System (Z-DOS) versions for the new H/Z100 machines. The version I'll be talking about in this review is the configuration for the H/Z89 (or H8 with H19), and it is revision 5.12.

I first heard of Spellbinder around the fall of 1981, when I was searching for a flexible CP/M word processor to provide some functions and features not available with Autoscribe. I wanted my Diablo's print capabilities to be fully exploited for my technical writing. Spellbinder was available, and not only was it configured for the H/Z89's function key set, but it also included the macro features, as well as a powerful screen editor and very flexible printing. The sum of these features sold me on it. The current version, 5.12, has 13 macros already written for you, a broad and flexible command structure, a built-in type-ahead buffer, a help system, and to cap it off, a very useful CP/M-like command mode.

If you are not familiar with this program, the point is now worth making that it is *not* one suited for the novice, nor for anyone dependent upon menus. The program is powerful not just in terms of editing, but also printing. And it really does makes a letter-quality printer talk. But you do need to know how to get the most out of it, by learning and using all the commands available. The program has some nicely chosen defaults, which let the new user manage without undue complexity. However, the commands are free-form. And while they are flexible, *you* determine overall efficiency, by just how well you use them. Once you master the commands, you may also find Spellbinder useful for assembly-language source code editing. (I use it quite often as just a general editor, aside from its use as a word processor.)

It is useful to start this all off with some words on what a word processing package is, as opposed to just a full screen editor (like our Heath favorite, PIE). All editors do indeed edit, but they may or may not go further, meaning formatting and printing, and flexible file handling. Word processors not only include the screen editor, but also have the ability to format documents for printing, and to print the document; in addition to having generally more powerful and sophisticated editing.

Differences in exactly how and to what degree a given package meets your needs is what actually separates different programs in the real world. With the highly competitive world of today's word processors, some very powerful programs exist for the Heath/Zenith hardware. Many of them feature additional bell-and-whistle capabilities (spelling checkers, merged printing capability, macro ability, indexing, footnoting, etc.). Some of them are actually program families, involving a series of related modules working with a main program, sometimes as a one-price package, sometimes not. You really need to know the various capabilities as well as your needs, to choose the best and most efficient one. (As an ironic aside, one of the most highly priced CP/M word processors, WordStar, is not sold in a form configured to allow you to use the H/Z89's function keys!)

Installation

Installing Spellbinder is really easy, as your distribution disk comes with a Heath COM file already configured for your hardware. This file (HSB.COM) is a self-patching version of Spellbinder, for the H/Z89. When you first call it, the program prompts you with a series of questions to decide on row/column numbering (on/off) and help guides (on/off), and to select printer type. You also get to decide whether you'll use the '89's keypad and function keys for cursor control and command input. Otherwise, you have to use the standard keyboard and control characters to do anything. Needless to say, the function-key setup is much easier to use. Heavy users of the program can get custom keytops, if they so desire, from a number of vendors.

On your own configuration setup, I recommend that you keep the help guides initially. Then later on, you can re-configure to drop them, in order to gain about two kilobytes more of working memory. Programmers can further customize Spellbinder, with the supplied HTIOS12B.ASM file, which allows customized screen prompts, keyboard and terminal configurations, and printer drivers. Spellbinder supports three different printer classes. Among these, device 0 is a precision (letter-quality) unit, device 1 is a dot-matrix unit (ASCII and ESCape characters), while device 2

is a CP/M LST: device (ASCII only). All of them are selectable from within the program, and may be SAVEd, as a default configuration.

Documentation

The Spellbinder documentation is divided into a number of loose-leaf sections, which are composed of a pull-out tutorial, a quick summary of commands, a general-reference part, a part on the macro features, one on peripheral interfacing, and a section on how to write your own macros. The manual's table of contents indicates general topic headings, but the manual is not indexed. Both the main manual and the tutorial sub-manual show off Spellbinder's printing capabilities, employing left/right page numbering, footers and headers, etc. These were combined with boldface, justification, underscoring, etc., and Spellbinder's two-column print macro, driving a Sanders printer.

While there is no pull-out reference card for the command summary with Spellbinder, it still has a good balance of help available. Integral to the COM file itself are optional command summaries, for EDIT and COMMAND modes, which serve as on-screen reminders. (They can be toggled off.) If you want more help, the HE command can be used to read in any of the detailed help files from disk. My main gripe with the documentation is simply that the manual is not indexed, making it difficult to find something specialized. The style tends to be rather terse in some areas.

Using Spellbinder

Once configured, Spellbinder when called signs on with the version number, your serial number, and copyright notice, prompting you to hit any key. Any key other than ESC at this point enters you directly into the EDIT mode, ready for text entry. The ESC key is (here) a file recovery command, which will resurrect from memory a file just previously active, after a crash. You'll only need to have this feature bail you out once to love it, as it will save you from re-entering text otherwise gone forever.

In operation, Spellbinder has two distinct modes, COMMAND and EDIT. While they are separate, many commands are common to both. As noted, there are no menus for either the COMMAND or EDIT modes to select a given command. While some may view this as a lack of friendliness, programmers are apt to like this stick-shift versus automatic approach.

For EDIT mode text entry, Spellbinder operates continuously in an overtype mode, writing over anything that's there (unless you go into INSERT mode—discussed below). Text entry is always wraparound, or wordwrap. So, you don't need to waste time putting in carriage returns. Spellbinder stores word-processing files as continuous ribbons of text, with paragraphs delimited by hard carriage returns. Individual lines are delimited with soft CRs, in the form of control N's (for end-of-line). This does make Spellbinder files non-printable from CP/M. However, they may also be written to disk with an optional switch, for compatibility. In comments accompanying this article, I go into an interesting problem (and its solution) with regard to adapting Spellbinder files to other formats (and vice versa).

With this scheme of operating, Spellbinder files are easily manipulated for any desired format. Unlike some word processors, Spellbinder prints from memory, not disk. Once a document has been formatted, it can be immediately printed, without saving to disk. (Not a good habit, however, so don't take this as a suggestion!).

The file you are working on is displayed showing the actual length of each line by the "<" character, for hard carriage returns. For example, Listing 1 is a sample CP/M ASCII file, where the "<" character represents the carriage return/line feed pairs in the file. In contrast, a standard Spellbinder word processing file would not show them that way, since the file has soft CRs (control N) for end-of-line, which do not show on-screen. This allows editing and reformatting to any line length. Note that this example also shows the screen-

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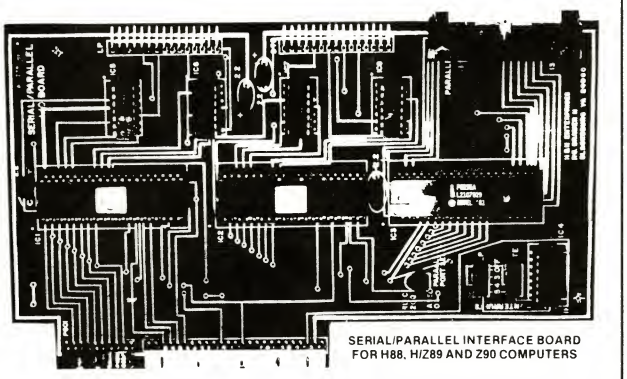

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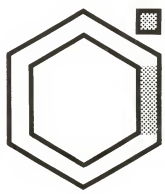

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width at 65 characters (dotted). I like the use of "<" to indicate the hard CRs, as it lets you see the actual length of a line.

```
COMMAND:                L 0001  C 001   *WORD*
                                                                    .
On your own config setup, I recommend that you keep the help<       .
guides initially, then later on re-configure, to gain working<      .
memory. Programmers can further customize Spellbinder, with the<    .
supplied IOS.ASM file, which allows customized screen prompts,<     .
keyboard and terminal configurations, and printer drivers.<         .
Spellbinder supports three different printer classes. Among<        .
these, device 0 is a precision (letter quality) unit, device 1 is<. .
a dot matrix unit (ASCII and ESC characters), while device 2 is a<. .
CP/M LST: device (ASCII only). All of them are selectable from<     .
within the program, and may be SAVEd, as a default configuration.<. .
                                                                    .
                                                                    .
                                                                    .
                                                                    .
```

Listing 1: A sample CP/M ASCII file produced by Spellbinder. The "<" characters represent carriage return/line feed pairs in the file. A standard Spellbinder file would not show them in this way, however, since such a file uses soft carriage returns (control-N) for easy reformatting.

COMMAND mode commands

Spellbinder uses a flexible but powerful command set, with many commands functioning in both COMMAND and EDIT modes. For the programming minded, COMMAND mode commands can be stacked in a sequence, as well as written into macros. I'll summarize the major commands between COMMAND and EDIT, and hit macros separately.

In the COMMAND mode, Spellbinder has commands related to editing and/or cursor movement, printing, and file input/output (I/O). As far as editing, the commands relate to cursor movement, deletions, moving blocks of text, and search/replace operations. The cursor can be moved forward (F) or backward (B) in the file, to the end, or by "n" lines, or to a mark (the caret mark, "^"). Deletions (D) can be from the cursor position to end of file, "n" lines, or all text. The potentially nasty ones (meaning if you mess up!) employ prompting, like "REALLY? (Y/N)". You can define a block of text from the cursor position to a mark, to the end of file, or to "n" lines; and you can move it into a hold (H) buffer. A held block can then be "unheld" (U) or re-inserted one or "n" times, anywhere in text. The hold buffer itself is limited in size only by the computer's available workspace memory (less the size of the file being edited).

Search (S) and replace in Spellbinder can be a simple search and find, or a search and queried replace which asks you whether you want a change made, as well as an automatic search and replace. The commands can be either stacked so that they're automatic, or interactive so you do them yourself. They'll operate on text in memory only, or on the entire file (including what's on disk). Syntax modifiers let you set up search/removal, string modifiers for whole words, letters upper or lower case or both, and wildcard searches for ? characters, numbers, non-numbers, and non-letters. An interesting example of a special search operation is discussed under "Macros" below.

File manipulation with Spellbinder is generally well handled in almost all regards. However, a caution is that nothing happens until *you* give the direction. For example, the operating system won't necessarily open any files at all unless you read in a previous text file or write out just entered/edited text. And you simply cannot exit the program with files open, as will be the case when you're working with a larger-than-memory file. When you write to a previously used filename and extension, this creates an automatic backup (FILENAME.BAK); and a second write bumps the BAK file of the originally named file.

A nice trick is that an aborted write to a disk does *not* dump your keystrokes to oblivion. Instead, it just gives you a calm error message. Disks can be changed while in the program: simply log in a new disk by doing a directory, then you can write to it. "Disk full" is not the horror with Spellbinder that it is with some programs.

Writing a file to disk is quite flexible. It can be done from any cursor position, by "n" lines, or out to the end of text; and multiple writes to the same file are possible. I normally use a file write as W/WD (write/write done), which writes out the entire file (with the cursor at the top), and closes it. The text then remains in memory for more editing. If no further work on the text is needed, it can be written out and cleared from memory with the alternate GD command. Either way, you stay in the program.

Reading files from disk is where the program shines. A read can be either complete (via the R command) or in terms of "n" lines (via Rn). If there is text already in memory, the new text goes at the bottom. Or, an RI command can read and insert a file at the current cursor position. And, Rin will read and insert "n" lines at a cursor position, with the limit of "n" at 250 lines.

With files larger than your available transient program area (TPA), things become different, operationally. If you have a system with 64 kilobytes of random-access memory (RAM), the amount of workspace Spellbinder will allow is on the order of 25K, so you do profit by using all RAM possible. Disk buffering is used for oversize files, with a write file being opened for the edited file.

The file handling for larger-than-memory files is, to put it plainly, not convenient to use, since it is not automatic. Spellbinder prompts you to give it a name for the write file when asked to read the larger-than-memory file. Segments of the file are read into working memory, you edit them, and when you want to move on, they're written out to disk (with the G command). Unfortunately, what has been written is gone, and cannot be retrieved and re-edited except by finishing the operation and restarting.

This method of larger-than-memory file handling can be a real source of irritation if you are used to transparent disk buffering, available with editors that use swap files. My own feeling regarding oversized file handling is that the operation(s) would best be made transparent, which would allow such files to be manipulated with the same degree of ease and flexibility as in-memory files. It would be nice if this could include the flexibility of file naming and I/O, where the combination of features is actually one of Spellbinder's better suits. My discussions with Lexisoft suggest that changes in this area are being considered.

Spellbinder has a built-in disk directory, which sizes the files and reports the total disk file summary in terms of bytes used. The directory is not sorted, which can result in confusion with high capacity disks (much less hard disks). And there is no selective directory (just all or none). Files can be deleted from disk, but they cannot be renamed or copied. (To my mind, though, the latter two really seem more system utilities.) Fortunately, there is a way around these limitations, covered below.

As noted, printing in Spellbinder is always from memory; the P command prints one page. (The default length for a page is 54 lines.) Pn prints "n" lines, and PA the entire file in memory. PG will print an entire file, from disk. A neat variation of the print command is "PO", or the print-to-disk command. This provides a CP/M-compatible ASCII file, which can be later listed at any time, with PIP or any comparable CP/M utility. Your CP/M LST: device is used, with the print features of such a device supported.

A COMMAND mode command alluded to above is one I feel puts Spellbinder in a unique class. It is a CP/M-like com-

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mand mode, from within the program, called by "C/". From this mode, any CP/M COM file (20K or less) on the A: drive can be executed, such as STAT, PIP, RENAME, your favorite directory program, or whatever. Lexisoft has a nice thing going with this feature, which they say allows the companion program "Spellcheck" to be executed, without leaving Spellbinder. Well, of course, it does that. But "any COM file (20K or less)" allows other stand-alone spelling checkers to be used, as well as a great number of word processing related utilities (indexing, footnoting, etc.) and other CP/M programs.

With it, you have a CP/M command line (without program exit, or loss of text), which gets around the directory limitations mentioned earlier. Unfortunately, there's less freedom of operation than with using CP/M directly. And when exiting this mode, your default drive will be A: (even if different previously). Quirks such as these aside, however, more editors could benefit from such a feature, as it is somewhat of an ultimate bailout. You can even pull a fresh disk out of the box, format it from within the program, and then write to it!

EDIT mode commands

The EDIT mode commands, even in the version for the H/Z89, allow one the choice of using either the standard keyboard, or the special function key set. But don't waste your time using Spellbinder without the H/Z89 (H19) function set, since it is very much enhanced in operation by activating the function keys, as discussed below. (With the commands I'll discuss here, the H/Z89 function/cursor key used will be shown in parentheses after the name of the command. You should note that the Z100 uses different keys, but is functionally similar.)

In the EDIT mode, text is entered continuously with automatic wordwrap. For insertion of new text into old, the INSERT (ENTER) mode (an EDIT submode) breaks away text below the cursor, and allows additional text to be appended from the break. Toggling INSERT back restores continuous text with the newly inserted material. A quirk of Spellbinder which I do not care for is that it will not allow you to move backwards past the current line, while in INSERT. You have to go out of INSERT, then move the cursor back to where you want it, then go back into INSERT.

The line length defaults to 79 characters, but can be set to other widths. Then it will show the width with a dotted vertical line (see Listing 1). Horizontal scrolling is supported in the EDIT mode, for lines up to 159 characters. The screen display automatically shifts over as the line being entered passes 80 characters, and indicates the correct screen display on the line counter.

Cursor movement in the EDIT mode is very flexible, as it can be either forward (IL) or backward (DL); and by character, mark, word, sentence, or paragraph (selected by IC and displayed on the status line). The cursor can be moved up and down with the keypad's cursor arrows, as well as left/right. The cursor can also be SCANned (HOME), from the line extreme left to right, with alternate SCAN keystokes. Repeat is via the REPEAT key for the H/Z89.

EDIT mode deletions (DC) are also by character, mark, word, sentence, or paragraph, from the cursor position. The paragraph deletion is prompted, but watch it, as there is no "undo" key function, for any mode.

"Enhancement" in Spellbinder is a dynamic change in a print character, according to text-enhance character toggles, and determined by a special character entry in the print table discussed below. This allows underscore, boldface, overstrike, etc. Enhancement can be entered into text by a toggle (f4) which starts enhancement (with subsequent typed characters enhanced as long as desired); then the toggle is turned off (f4 again). Another flexible way is to use mode enhance, which enhances from the cursor position, by the current enhancement mode (selected by f3). Both these methods display the enhanced portions of the text on the H/Z89 screen in inverse video.

Screen re-writes are automatically done by Spellbinder as required, such as when you want to move to a line below the bottom of the screen. And the screen can be manually re-written with the cursor at the top, with the REWRITE (WHT) command. Paging backward or forward in text is done with the PREV (f5) and NEXT SCREEN (ERASE) commands. These commands do not pre-empt each other. So they can slow things up as the screen re-writes five times, say, when you hit the f5 key five times to go five pages back. Spellbinder has no true line-by-line scroll capability per se, and this would be a welcome addition.

TAB settings are defaulted to eight spaces, but they can be set as desired. And decimal TABs are supported for columns of figures. (TABs are changed as desired, with the COMMAND mode "Z" command). A powerful complement to the standard TAB function is INDENT (f1), which indents the current line to the next TAB stop and rearranges the rest of the paragraph to accommodate.

The mark character used by Spellbinder is the "^" character, which is entered with the (RED) key. It can be embedded in text (its function), but it will not (normally) print. If desired, it can be forced to print (with an enhancement technique).

In addition to the above, the EDIT mode also shares a few COMMAND mode commands, by the use of the ESC key followed by a single letter. Examples are ESC T and ESC E to put the cursor at the top and end of file; ESC H and ESC U to hold and unhold; and ESC F and ESC B to go forward and back to a mark. This helps minimize keystrokes, by avoiding the requirement to go to COMMAND from the EDIT mode and back again.

Printing

Before printing, a document can be previewed for correct formatting, using Spellbinder's print-to-screen feature. This shows any enhanced text (underscore, boldface, etc.) in reverse video. As well, it shows the formatted line spacing, centering, right justification (as they would appear on the LST: device), and page breaks. The display is not exactly like the actual final type on a letter-quality printer (for display limitation reasons). But it is a workable approximation, and saves time and paper. The preview function has built-in checks for long words that must be hyphenated to fit at the end of the line. It will prompt you to do so as needed. If the file being formatted passes the preview test, it will print.

You will use a single dot command string (on a line by itself) for most of the formatting commands in Spellbinder. The various commands make up the "Y" table, which is in the form of .Y n1 n2, etc. In addition, there is a related title/page format table, or YT table. The main Y table controls the major printing format functions, while the YT table controls titling, headers, footers, left/right page numbering, etc. Because of built-in defaults, one can actually use Spellbinder without ever referring to or altering these Y (or YT) tables. Space does not allow a detailed discussion of these tables, but I will tell the basic "what" of them, if not the why and how.

The Y table can be changed either manually, by menu selection; or dynamically, by commands embedded in your text. The menu is brought up from the COMMAND mode, by a "Y" command, for altering the Y table. Major (non-dynamic) selections are for the printer type and the destination port address. Once these two parameters are set, you should SAVE the program version on exit, to avoid the necessity of resetting them, and you can SAVE multiple versions for different port assignments and printers (a dot-matrix for drafts, a letter-quality for final copy, etc.). Other entries in the table set parameters such as print routine, print length, form length, page indent, spacing, justification, line width, line feed size, character size, special character, and maximum/minimum spacing for justification.

A powerful feature of this approach lies in its flexibility. The Y (and YT) statements can be imbedded within the file by a simple "FY" (or "FT") command. This allows a Y table to be altered line by line (if necessary) and later recalled

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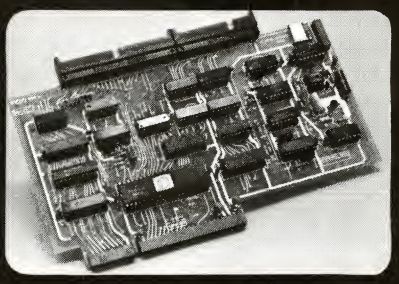

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from disk along with the document.

In addition to the Y and YT tables, Spellbinder also supports simple dot commands for the functions of center, remark, form feed, page headers, vertical TAB for two-column printing, and so on. It also has in-line commands, which can be placed anywhere on a line. The mark character is the most obvious example; but there are a number of others, for super- and subscript (these can be nested), firm hyphen, text enhancement, absolute TAB (allowing vertical alignment under proportional-spacing print mode), "line tweaker," and printer control sequences.

Some in-line commands dynamically modify Y table entries, which extends further flexibility. There are commands for changing of the text enhancement, the font, the line spacing, and the ribbon color—even within individual words. There is even a "user-defined" section in the IOS.ASM file. There one can write custom controls to redefine escape sequences for different printers. And there is a user-alterable space table for use with proportional spacing.

For optimum control of print appearance, Spellbinder has three kinds of hyphens: hard, soft, and firm. Hard hyphens appear all the time. You put in soft hyphens to appear—on screen or in print—only as needed to break a long word at the end of a line. Firm hyphens will show up on screen but not in print unless needed at the end of a line.

And there are two kinds of print formats: line- and character-oriented. The character-oriented format is the generally preferred routine, particularly for justified text. In line-oriented format, the print copy will appear as the screen did. With character-oriented format, the line width will be determined by the YT table.

Hyphenation can be one of the trickier parts of printing and formatting, but with the screen preview feature and prompted hyphen help, it is manageable and yet flexible.

The best way to summarize Spellbinder's print capability is via a demonstration, as in Listing 3. The top sample shows the standard (fixed pitch) mode of print. The bottom is the same text in proportional-space on a Diablo. See further comments under "Macros."

Macros

One of the features of Spellbinder which set it apart from many other word processors is the built-in macro capability. You can use Spellbinder macros in any (or all) of several ways. You can use the supplied "load and go" macros. Or you can write your own. Or, in a more limited sense, everyone can use the stacked commands, which amount to macros. (They are in fact usable within macros, as will be seen.) These are discussed below, in all of these contexts.

As just noted, COMMAND mode commands can be "stacked" in Spellbinder, to create some useful functions. Spellbinder refers to these commands as "Autocommands," or simply a sequence of commands, entered on one command line. A simple and obvious example of command stacking might be "T/W/WD". (Go to top of file; open file for a write; write out entire file in memory and close file.) And this one will do just that.

When you prefix an autocommand with the modifier "n", for "n" executions (up to 250), you have a simple macro. Commands can be stacked in any number, as long as they don't exceed one line length; and the autocommand executes upon a CR. And an autocommand can also stop and prompt you; for example, to reload the printer.

You can enter and/or edit your own macro, by use of the COMMAND mode "AT", which will take all the text from the cursor position to the end of the file, and whisk it away into the macro buffer. For example, if you key in the sequence "S//* <", (where < is the CR), then place the cursor over "s", and do the AT, you have a mini-macro which prints a *. The loaded macro stays in the buffer until another AT, or until overwritten or cleared. So when you strike the CONTINUE (BLUE) key, in either the EDIT or COMMAND

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mode, you repeat the macro operation. Do an "A40" from the COMMAND mode, and you have a line of 40 *'s! If you wish to edit the macro, do an AT to recall it; modify it; then an AT again to move it back to the macro buffer.

Obviously, this short example leans towards trivia, but it does illustrate how close the basic macro writing is to stacked commands. The example is just stacked commands, but it is still functional, and could be saved to disk as a macro, with a file type of "WPM" (the default extension for macros).

Of course, you don't need to know how they work in order to appreciate the added power macros can give you. And Lexisoft has made it easy for you by delivering Spellbinder with 13 useful macros which are ready to load and execute.

These macros are designed around a variety of office tasks, and enhance the utility of the word processor quite considerably. As their names imply, there are macros for file line numbering (LINENB.WPM, useful for legal drafts); forms creation and fill-in (FORMS.WPM); boiler plating for form letters, contract language, etc. (BOILER.WPM); batch printing (BATCH.WPM); sorting (ALPHA.WPM); merging of data lists into letters for mailing (MMERGE.WPM); addition of columns and rows of numbers, and a calculator (CALC.WPM); a key phrase locator (CUESORT.WPM); columnar movement (MOVEIT.WPM); and two-column printing (2CPRNT.WPM). There is also INSTALL.WPM, a configuration macro, necessary for some of the others.

Some of the more useful of these ready-to-use macros are those associated with printing. For example, Listing 3 demonstrates the 2CPRNT macro in two printing modes. I find the quality of the proportional-space mode (bottom) nothing short of superlative, but note that all the other Spellbinder print variations are available as well.

Do-it-yourself macros

But you're not limited to just the 13 ready-to-go macros, although many of you won't need any more. The manual devotes 10 pages to more detail on the macro programming language, and there is also a dedicated 43-page manual on it, for $25 (list). Since macros can be such a potentially handy tool in the hands of the experienced programmer, it is appropriate to review briefly this Spellbinder macro language, which they call "M–speak."

In general, programming in M–speak allows the use of most of the commonly used COMMAND mode commands (T, top; E, end; Rn, read n lines; and so on), in upper or lower case. It also allows the disk-I/O related commands, such as R, W, etc.; with these latter commands requiring operator keyboard input. There is also a set of commands unique to the macro language, characterized by the use of a leading colon, ":". These are summarized in Table 1.

```
t;                                                          1 go to top
:in "#1/#0/What string? " %A;                               2 prompt, read string
s/%A;                                                       3 search for string
:cp;                                                        4 center text
:pr "#0/#6/Hit any key to edit, CR to search/scroll";       5 home cursor/clear
;                                                             to eol/print inter-
;                                                             active prompt string
:cm;                                                        8 put cursor on string
:on ?-3 10 12 10;                                           9 over and out!
:rk %1;                                                     10 read keys
:on 13-%1 14 3;                                             11 CR loop, else done
:pr "#0/#6/End of text! Hit any character to edit.";        12 tell em done
i;                                                          13 wait for key
:ee 3;                                                      14 go to edit
;
; This macro is used for search and edit operations. When first called, it
; prompts the user for a search string. It then searches for the string,
; and when found, re-writes the screen with the line containing the string
; centered, and the cursor on the string. A CR will search again, and any
; other key will take the user direct to EDIT. After editing, search can be
; continued, with the BLUE key. Uses H89 graphics.
;
; 03/25/83 Walt Jung
```

Listing 2: A macro used for search and edit operations. The comments on the right describe the general flow of the program. (Places underscored would appear in reverse video.)

Many of these commands (and the macro interpreter itself) serve as reminders of standard BASIC. For example, ":pr" is the string print command, and ":in" is the input command with a string print prompt. There are string variables, as %X (X = upper case letter); and numeric variables, as %n (n = 0–9); as well as conditional branch commands. Within the string print functions are allowed a number of ASCII control values, which control the terminal functions. With space being limited, I thought the best way to demonstrate some of the variety of these commands was to write a simple demo macro. Usually such things turn out to be solutions looking for problems, in a functional sense, but in this case the resulting macro has utility, as well as tutorial value.

Listing 2 is the example macro, which in terms of operating code, consists of lines 1–14 (less the comments). This macro is used for search and edit operations, where one can search for a given string, do some editing, then search again. The comments to the right describe the general flow of the program, but the use of the commands themselves is more helpful towards understanding what's going on.

The first line goes to the top of the file (t). Then it asks for a string, after homing the cursor (#0) and clearing the screen

Major ingredients of print appearance in a word processor are how the space between characters is handled, as well as the character size. True proportional printing varies the character to character spacing dynamically, and uses a proportionally spaced print wheel, for the highest quality of appearance. With **Spellbinder**, a precision printer allows horizontal spacing in increments of 1/120", and a user alterable space table is provided. With ordinary printers, character spacing is in fixed increments.

The total combination of printing support and range of control variables in **Spellbinder** is impressive, if not simple to master. Unfortunately, there is enough which could be said on it to fill a small book, so in summary I'll say that you are not likely to be disappointed by the print capabilities of **Spellbinder**, once you've mastered all the variations.

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Listing 3: A demonstration of Spellbinder's print capability using its two-column print macro. The top sample shows the fixed pitch (12 characters to the inch). The bottom shows proportional spacing. Proportional spacing takes up less space than a fixed-pitch printing of characters of about the same size because common letters like "i" and "t" are relatively narrow.

(#1). The string (%A) is found and the text is displayed with the string found in the middle of the screen over the cursor. The user is then prompted for edit or another search. The end-of-text comparison is done on line 9, with the branch comparison (:on). The keyboard is read on line 10 (:rk), and the program either loops (if no end-of-text), or exits to the EDIT mode. If, after editing, the macro is re-entered (by the BLUE key), it will pick up where it stopped, with the previous string for search. Line 12 uses the :pr function, to print the end of text message, and line 13 reads the keyboard (i). Note that the *underscored* string expressions are displayed enhanced, and show up on the H/Z89 in inverse video, for clarity.

```
:ON condition n1 n2 n3              Conditional branch
:PR "string expression"             PRint command
:IN "string expression" %n (%X)     INput command
:CP                                 Cursor Print
:CM                                 Cursor Move
:MC expression                      Move Cursor to location specified
:SE %X                              Set String Enhance on %X
:SS n                               Set String Size to n
:SL %X %n                           Set %n to the string length of %X
:SF %X expression                   String fix length of %X to value specified
:%n = expression                    Assign value to integer variable
:%X = "string expression"           Assign value to string variable

n = 0-9
X = A-Z (upper case)
expression = arithmetic expression
string expression = ASCII string with imbedded variables
```

Table 1: A summary of macro commands available under M-speak.

This macro functions as shown, but some cautions are in order, based on my experiences with M–speak. Watch how you comment the code. Comments preceding working code inhibit operation—as do comments on a line following code if the semi-colon is not placed immediately after the last code character. For example, line 1 would not work if the ";" were placed just before the "1" (instead of as shown). As far as I can see, neither the main manual nor the M–speak manual makes mention of these conventions. However, once these conventions are understood, there is no problem with handling comments.

Other problems I noted with the M–speak manual were the lack of an index, and simply that it was outdated. Although I received the M–speak manual just this April, it is applicable to V5.03—while the current Spellbinder release is V5.12. As a consequence, there are actually commands which function, which are not in the M–speak manual. (They are, however, found in the main manual.) An example of this is the ":rk" command. No hint of it in the M–speak book, but it works in this macro. Also, watch any print or formatting Y table handling, as the M–speak manual refers to the older Y table format used with V5.03.

The Spellbinder program has the potential of shining the brightest with its macros. However, it is relatively limited in terms of what the *non-programming-oriented* user can do with it. This is because of both the macro programming itself, and the documentation. Note, though, that this comment is applicable to the context of writing one's own macros, not using those supplied.

In discussing this with Lexisoft, I found out that their point of view is that M–speak was not really intended for the average end-user. Rather, it was meant for them, their distributors, and their dealers. With M–speak, they can more readily create custom applications that would not otherwise be available. Unfortunately, this may not readily come across from their manuals. If this is their purpose, it seems easy enough to warn end-users what they're getting into; so be forewarned. In any event, the macro manual should be re-written and updated, and the macro programming conventions clarified.

Flexible file conversion with CONVERT

As would logically be expected, this review was written with Spellbinder. However, in preparing the files making up the manuscript, there arose a compatibility question, since I had understood that *Sextant*, like many publishers and typesetters, preferred electronic media to be submitted in a WordStar file format, not Spellbinder! Well, a Spellbinder file and Wordstar file are simply not the same; in fact, they are not really close.

As it turns out, that was not the case, and actually, *Sextant* can accept files in virtually any format. Nevertheless, this proved fortuitous, since I know I may face that problem sometime. In any event, Lexisoft had the answer.

I discussed this problem with Perry Gee of Lexisoft, who thereafter provided a program they have recently written, called CONVERT. This program (available to Spellbinder licensees) was developed to allow word processing files from other word processors such as WordStar to be easily translated into files compatible with Spellbinder, for printing or further editing. As it comes, it will read a WordStar file, and convert it into a format very close to that which Spellbinder would have created. To verify this, a portion of this manuscript was written under WordStar, then CONVERTed to Spellbinder, and it integrated smoothly into the remainder.

That, of course, is certainly one very useful application for such a program—but hold on, there is more. The way CONVERT works is to take each character of the input file, and process it as specified within an internal character-translation table. The input character can be dropped, or mapped into alternate characters or character sets, including toggled pairs.

Each possible input character is assigned to this table, which can be set up for the desired translation (if any). If a character is not to be translated, it is simply passed through. Since this table is described in some detail in the supplied documentation, it is a fairly easy matter to go into CONVERT with DDT or another debugger, and patch the translate table. With the appropriate character functional equivalents, this allows a new version of CONVERT to be set up. For example, I wanted Spellbinder files to be CONVERTed into WordStar format. So I made the changes needed, and renamed the SAVED file. In this manner, this review in Spellbinder file format was CONVERTed, and then sent off to *Sextant*.

As I see it, CONVERT is a program which has utility far beyond the ostensible use of reading Wordstar files into Spellbinder format. It could easily be adapted to manipulate other word processing files into Spellbinder, or vice-versa. For writers faced with a necessity to interface with differing file format requirements, it will save a lot of time and greatly minimize re-editing. Nice job Lexisoft!

(WordStar is a trademark of MicroPro International Corporation, San Rafael, California).

Again, none of this will pose any problems for you if you rely on the 13 ready-to-use macros provided with Spellbinder. They're all many of you may ever need. The problem is, they may only whet your appetite for more. If so, be prepared to proceed slowly. While it may be frustrating at points for some, I think you'll find M–speak's benefits ultimately worth it.

Support

My experience with regard to support of the program has been good. My dealer, Ray Massa of Studio Computers (999 South Adams, Birmingham, MI 48011) has always been helpful answering questions, as have Perry Gee and his staff at Lexisoft. Spellbinder licensees may update older versions of the program to a new revision, by returning the distribution disk with $50. Also, Spellbinder license holders may wish to check with Lexisoft concerning a support program, CONVERT, which will likely be useful when working with other file formats. (See comments accompanying this article.)

Summary

In summary, I would have to say that if you are a Heath/Zenith owner looking for a versatile and powerful word processor package, you should definitely consider Spellbinder. I will qualify this, to mean that you should consider it in the light of your own intended usage and general experience with editors and word processors. If you are more at home with free-form commands, and/or are programming-oriented, you should like it. But if you are more used to menu-driven systems, it might not be comfortable for you to use, at least initially, in spite of its many technical capabilities. However, if you are looking for extremely high quality of printing, don't overlook it, regardless.

I have used Spellbinder for countless letters and my most recent book (*IC Timer Cookbook, 2nd Edition*), as well as many articles over the last year or so. Two functions not presently supported in Spellbinder V5.12 are indexing and footnoting. Since the field of word processing is such a competitive one, I think that they are likely to be considered in the next release.

This article has not treated the 16-bit version of the program for the Z100, which I am told offers healthy bonuses of speed. This will enhance overall operation, as well as the execution of some of the macros, which (on my 2 MHz H/Z89) are slow.

Editors and word processors do tend to become quite personal attachments with heavy use, and we all tend to feel at home with one of them over others. In actual practice, there is of course no such thing as the perfect editor or word processor; they all have weaknesses and tradeoffs. (No matter how comfortable we become with them.)

Spellbinder has what I consider some areas in performance which could or should be improved, as are noted in the text. Of these weaknesses, none have been catastrophic to me, nor have they totally resisted bypass. But I can appreciate the possibility of a new user's becoming frustrated with the larger-than-memory file handling; or trying to write a macro and becoming confused. Fortunately, the program has such a number of positive performance areas that the pluses easily outweigh the minuses. Examples are the printing, and the macro capability.

It is highly important that any software tool used intensively be both comfortable and efficient; otherwise it becomes a burden, not a boon. In an overall sense, I consider Spellbinder to be a very powerful word processing tool, and one useful to my purposes. Hopefully, the detailed comments of this review will communicate whether or not it can also become that for you. I'd always appreciate comments and questions. I can be reached in care of *Sextant*; or via modem on the CompuServe HUG SIG (ID 71555,347); or on the Baltimore Heathkit Electronic Center RCPM, 301/661–2175 (24 hrs.).

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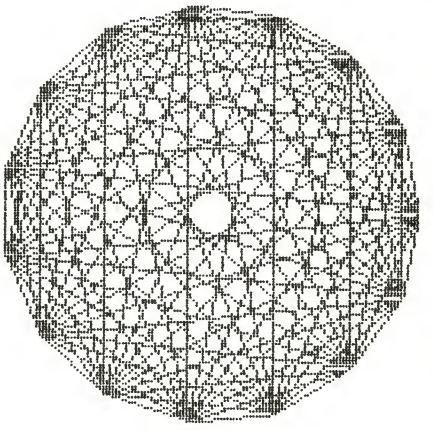

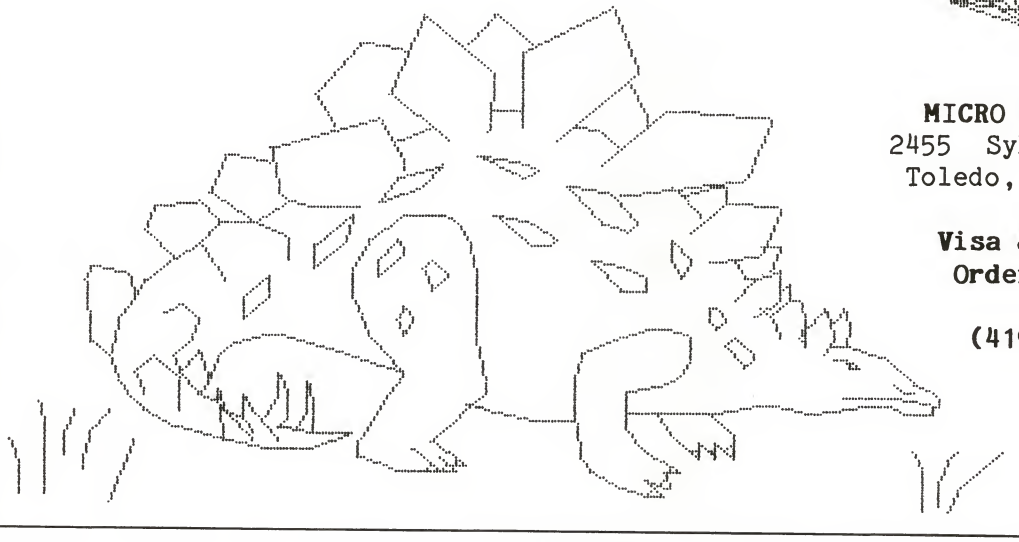

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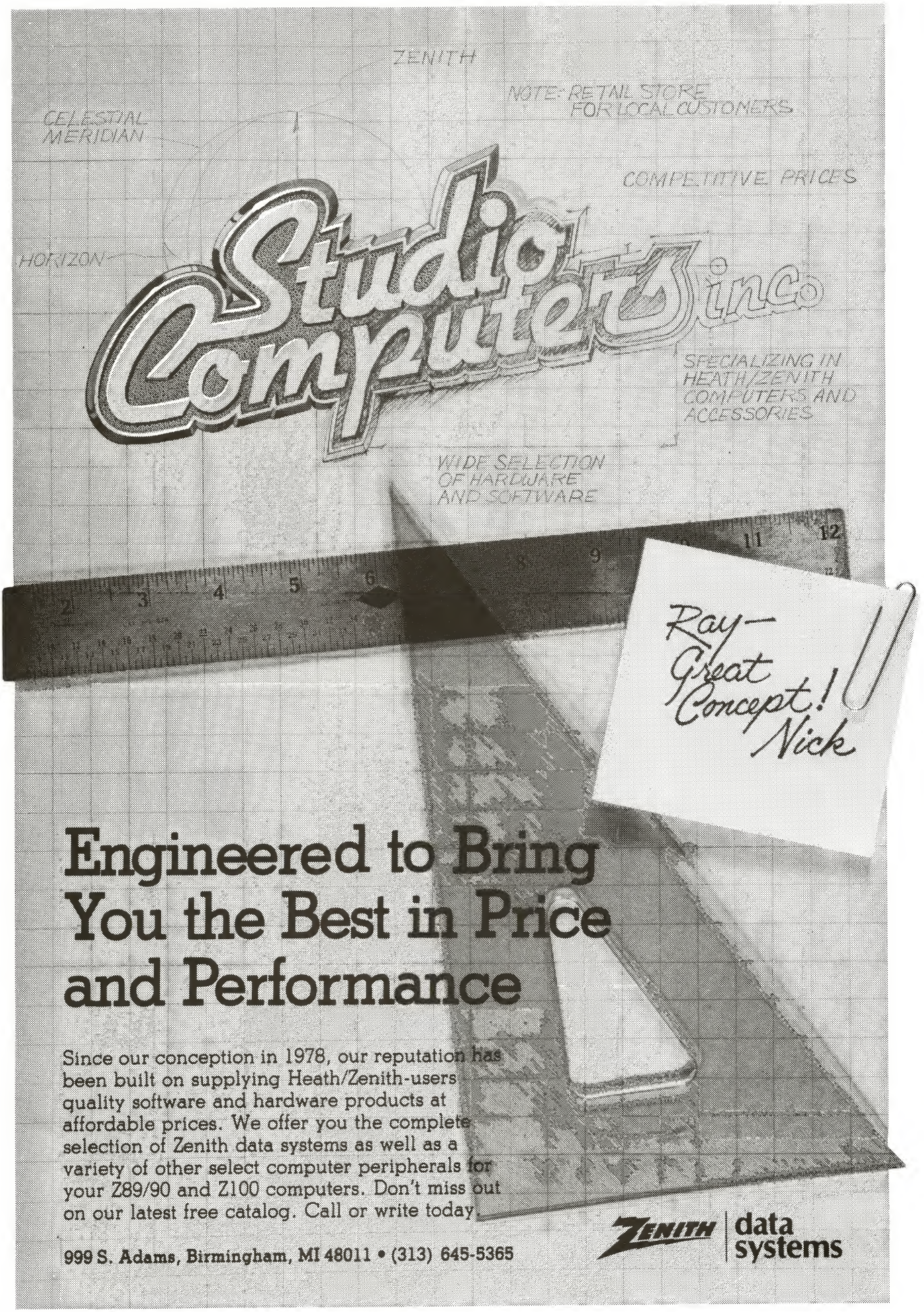

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Building Heathkit's H120

Kit-building is still the most economical route to computer ownership. And enjoyment is an important fringe benefit.

Hurley D. Cook

It was Christmas in May on a Thursday afternoon at 2:18 when my wife called the office to tell me the Benton Harbor boxes had arrived. Well, what the heck, I had some vacation time coming anyway, so I pressed my luck with Chicago speed limits getting home and started the unpacking forthwith.

The decision to build the Heathkit H120 personal computer had not been casual. Writing technical articles and related technical stuff is my livelihood, and I had discovered the speed and versatility of word processing. My office typewriter had been playing second fiddle for more than a year, and the idea of having a word processor at home had been at the top of my extracurricular priority list for months.

The system we're using at the office is built around a Zenith Data Systems Z89, originally obtained to file and analyze publicity results for a client. (We're a public relations firm.) Then someone bought a WordStar word processing disk and it wasn't long before it had a permanent home in Drive A.

I'm comfortable with the office '89 and was seriously considering setting up the same system at home—when the new Zenith "Z-Machine" was announced. I took the bait. Here was all the performance I'd come to expect from the '89 in a machine with double the amount of random-access memory (RAM) (128K minimum; expandable to 678K); more than six times the disk capacity (two 320K drives vs. one 100K); a bigger and better keyboard; faster operation (16-bit vs. 8-bit) but with the capability to handle all the 8-bit CP/M programs and articles I already had on disk; and an S-100 bus expansion capability for whatever new directions my interests might take.

I'd played around with the '89—after hours, of course—and had discovered there were a lot of rather interesting things to explore beyond writing articles on it (or about it). The Z-machine had to be the hands-down key to my personal computing future. My letter to Santa would have been short and sweet even on the old Selectric.

When the Heathkit version of the Z-machine appeared, the hook was set. I dog-eared the Heath catalog memorizing and comparing H120 specs with competitive micros that seemed to be in the same class. Once the decision was made to do-it-myself, I could hardly wait to get started. So my respect for Chicago speed limits momentarily went out the window.

Photo by Hurley D. Cook

Figure 1: Before construction starts, parts are unpacked and major pieces identified. Preassembled main circuit board and color video board are front and right.

Soup bowls on the pool table

The basement pool table provided space for checking contents against the shipping invoice and parts lists. When the last empty box landed in the corner, we walked around the table and almost reverently inspected the stack of circuit boards, cabinet parts, frames, cables, harnesses, plugs, escutcheons, paper bags full of hardware and small parts, disk drives the cathode ray tube (CRT), the keyboard, the power supply and a couple dozen strange looking doodads that seemed to have been thrown in as an afterthought.

I'm not a novice at Heathkits, but the feeling is the same every time. You have a general idea of how it's going to look and work when it's finished, but there's still that quiet moment—before you roll up your sleeves and plug in the soldering iron—when you wonder if there are going to be snags in getting it all together.

Unpacking, we discovered one of the items on the shipping invoice had been back-ordered with a scheduled shipping date two weeks away. It was the disk controller board, but it appeared to be a stand-alone part that could be plugged into the S-100 bus after everything else was assembled. So on with the show. In the "open-me-first" box the instruction manual was right on top, so I spent the rest of Thursday evening thumbing through it and sorting parts. A half-dozen cereal bowls and two soup tureens served to keep resistors, capacitors, diodes, transistors, integrated-circuit (IC) chips, sockets, and hardware separated and identified.

There are two schools of thought about how to tackle a Heathkit. Some kit buffs just start soldering. They find, identify, and install parts on the fly. I've done that, but—please believe me—it's easier on the nerves if you spend some time up front and make positive identifications.

Attaching labels to individual components takes time, but it's not a bad

idea. You don't have to squint at color code markings on the resistors, capacitors, and other small parts more than once.

The manual explains this coding system in excellent detail, but you still have to distinguish the markings yourself. A magnifying glass helps. Miniaturization is great, but the people who designed the color-coded ring system on quarter-watt resistors and picofarad capacitors couldn't have imagined how tiny they could—and would—become.

Heath helps by packaging many parts—especially those that look alike—in separate, well marked packets. And if you follow their advice and open only the packets needed for each phase of construction, the sorting task is much simplified. Another helpful item is a separate manual that has labeled drawings of all the parts and pictorials to show how they fit together.

Soldering started Friday evening. The first subproject was the video driver circuit board. The board is clearly labeled with parts locations. So if you stay awake, there's little chance of making a mistake in plugging the wire leads of all the resistors, capacitors, and transistors into the proper holes—especially if you don't have to rummage around in a soup bowl to find unlabeled parts.

For about the next 15 pages of manual instructions, these are inserted and soldered in place about a dozen at a time—smallest parts first. The last two parts on this board are the largest—the sweep transformer and a wire/socket assembly for the CRT.

When I came to the place where all the small parts had apparently been called for, it was disconcerting to find a resistor left over. Backtracking over the steps didn't uncover any omissions. About twenty steps later, the Heath guys set my fears to rest. "You will find you have a resistor left over," the note read. "Do not throw it away, it will be used later." They don't miss a trick. Or a resistor.

The video driver circuit board was completed by Saturday noon. It might have taken less time, but I still enjoy watching parts go together, and past experience has taught an important fact—the reward for a leisurely pace is quite often a machine that works the first time you plug it in.

The manual next called for unpacking the box with the disk controller board and to "proceed with the enclosed instructions." This obviously had to be ignored until last. Or at least until the box arrived, whichever came first. So the chassis and power supply were next.

Put the pieces together

This was mostly mechanical construction, because the power supply (a switching type, in its own metal enclosure) and the main and color video processor circuit boards were preassembled. After the rubber feet were attached to the chassis bottom, the main circuit board was tap-screwed to the chassis floor with the three parallel and serial port connectors and the light-pen socket at the back edge of the board lined up with matching holes in the back vertical chassis flange.

The color video board mounts near the front of the chassis just above and parallel to the main board using three one-inch pre-tapped spacer posts. Electrical connections between these boards are two short socket-fitted flat cables—edge-marked to ensure correct mating.

The back panel—a vertical extension of the back chassis flange—was fastened in place and the CRT brightness control pot was mounted on it. (The "left over" resistor was used here.) A cable socket is also mounted in the back panel for use with a separate color CRT monitor, if that is your wont. And about a dozen panel-colored plastic plugs cover all the unused holes in the panel just above and behind the five bus connectors near the rear of the main circuit board.

I had the feeling that if I ever removed all those plugs to accommodate as many S-100–compatible peripherals, my hobby budget would be totally devastated—along with my lunch money for the next ten years.

The power supply fits snugly against the left rear back panel where the power

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socket, 50/60 cycle switch, and cooling fan vent peek through pre-cut holes in the back flange and panel. Opposite, at right rear, the metal S-100 card cage was tap-screwed in place and the insulating plastic card-guides snapped into position.

Adhesive-backed strips of foam rubber laid along the sloping edges of the chassis front formed a cushion for the preassembled keyboard. The keyboard is clamped firmly in place by a large frame, about the same dimensions as the chassis, which covers the bare metal of the chassis and fastens to flanges at left and right. Two flat cables from the keyboard connect to sockets on and near the front of the main circuit board.

After a lunch-break, I sat for a few minutes and marvelled at how fast the machine was taking shape. Heathkits have traditionally been a bit of a challenge (but never as much as you let your friends think) which is what makes them fun to build. This one was turning out to be embarrassingly easy.

The H120 comes with one or two disk drives. I had opted for two and they slid into place—one above the other—in a sturdy bracket-box; eight screws in tapped holes held them securely. A panel with openings for the disk-drive doors dressed up the front, and the final touch to this neat package was the adhesive-backed escutcheon carrying the "HEATHKIT COMPUTER" nameplate. Very professional.

A flat cable with three sockets was snapped into the connectors on the two drives, with one socket remaining for the disk drive controller board. There were a couple of things to do to the disk drives before they could be used in the H120 system. Both drives come equipped with terminating plugs. But only the last drive on the cable should have one. In this case, it is the secondary (lower) drive. Simply removing the small terminator plug from a socket on the upper drive took care of that.

Additionally, the computer must somehow be told which drive is the "A" drive and which is the "B." To accomplish this, two jumper-plugs that look like IC chips—plugged into IC sockets—must each be programmed by cutting away most of the contacts that link opposite "legs" through the plug. For the A drive, only the first two legs on one end are left connected; on the B drive, it's the first and third.

Trying to cut the unwanted contact links through the tiny openings that ran down the center of the jumper-plug with diagonal cutters—as the manual directed—was like trying to pick up a dime in an ash tray with boxing gloves on. I improvised by finding a brad that was small enough to fit in the holes and drove it through each hole with a tack

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hammer to knock out the unwanted connections. Before doing this, however, it was necessary to remove the jumper-plug from the socket and place it upside down on a flat piece of wood. (The Heath guys can have this idea for free.)

Next came installation of the CRT and disk drives into a large vertical bracket that mounts behind the keyboard and above the chassis to hold all the remaining components and serve as a front framing mask for the tube and drives.

This was merely a matter of setting the tube and double disk drive module in place and tightening a few screws. The main thing to remember is that CRTs like to be handled with kid gloves. Breaking one and having it implode could be even less fun than having a cherry bomb go off in your hand.

The video driver circuit board, assembled in the first subroutine, was mounted on the side of the vertical frame near the CRT; the second-anode cable coming from the sweep transformer was clipped inside the hole provided in the top of the CRT; and the cable/socket assembly was attached to the connector on the tube neck.

At this point, the unused parts on the pool table had dwindled to almost zilch, and about the only thing left to do was to bring the bottom and top halves of the machine together, plug in the interconnecting cables and slide on the outer housing. But it was getting late, so I decided to hit the sack and get an early start next morning.

Before the Sunday *Tribune* banged against the front door, I had the cables connected and had run the recommended resistance checks. All the numbers checked out OK.

The moment had arrived. It was time to plug in the beautiful monster to see if there would be sparks and smoke or something on the CRT screen that would indicate at least a modicum of success.

I snapped the power switch to "ON."

There was a "beep," the fan began to whisper reassuringly, and a little green finger appeared on the upper left of the CRT, pointing at a blinking cursor—just like the book said it should. No sparks, no smoke. I don't think the feeling is quite the same as planting a flag on top of Mount Everest after scaling the north wall—but it's got to be cut from the same cloth.

My wife came down to see what the yelling was all about, but didn't quite understand the enthusiasm. "Of *course* it works," she said, "What's it supposed to do now?"

Back to the soup bowls

She had a point. Without the disk controller board, there was no way to run the demo disk that had been included for checking out the video display shape, size, and focus. So we flipped the ON-OFF switch, turned the CRT brightness up and down, played with the keyboard a little, then contented ourselves with just looking at it a few times a day while we waited for that last box from Benton Harbor.

So far, I figured it had taken about 19 unhurried hours to get the machine almost complete. It shouldn't take more than an hour or two to plug in the disk controller board, adjust the disk drives and video, and be ready to start exploring the Z-DOS, Z-BASIC, CP/M-85, MBASIC, and Multiplan Spreadsheet that were part of the package.

Two weeks later, on Friday afternoon, we did a rerun of the I'm-on-vacation speed-limits-be-damned routine. What went out the window this time was any thought of having the machine up-and-running in an hour. The disk controller board was *not* preassembled, and the old Heath challenge was back. The box

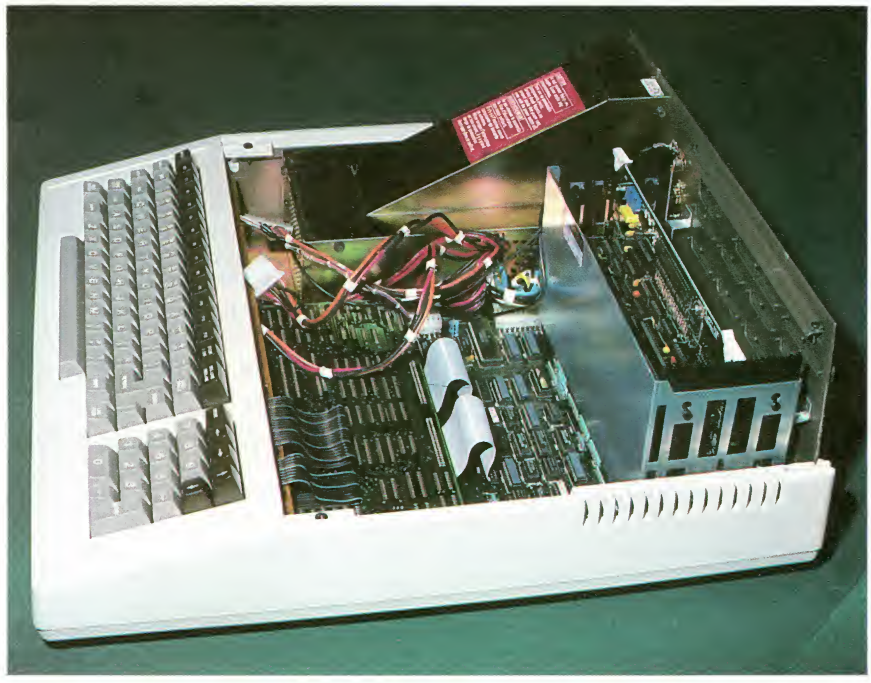

Photo by Hurley D. Cook

Figure 2: Power supply and card cage are installed at chassis rear. The keyboard rests on foam rubber strips and is firmly clamped in place by the chassis cover frame. Back panel is a vertical extension of back chassis flange.

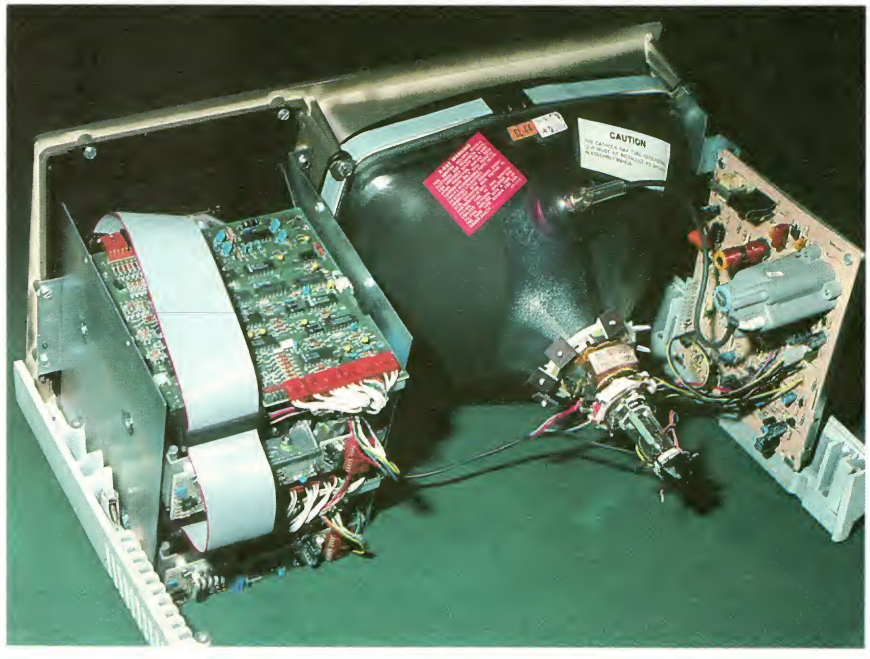

Photo by Hurley D. Cook

Figure 3: Disk drives, CRT, and assembled video driver board are all secured to the mask/frame to form the top half of the machine. Rear view shows the CRT neck-assembly and connections to the video driver.

wasn't all that big, but parts packages were plentiful, and this construction manual was twice as thick as the first one.

The soup bowls came out again.

I filed a sharp point on the soldering iron and settled down for a long session in the wonderful world of wire strippers, needlenose pliers, diagonal cutters, and hot solder fumes. By midnight, most of the holes in the printed circuit board were filled with resistors, capacitors, diodes, microswitches, and row upon row of IC sockets.

During this session I developed a new respect for modern printed circuit board designers. A lot of the holes are rather close together. I fully expected to have a little trouble with "solder bridging"—in which solder can accidentally solder two holes together that shouldn't be. But two design features kept me well out of trouble. For one thing, the holes are plated through so the molten solder is almost sucked into the hole.

The other neat trick is a little "moat" around each hole that rejects any solder that tries to cross over to an adjacent hole. This keeps the solder exactly where it's needed—at the foil/contact junction and inside the hole.

How well this works is evident when you look at a row of soldered contacts along the edge of a socket with a magnifying glass. The solder just builds up around the contact—even if you get overly generous with it—with no spillover. And because these isolating moats are a distinctive color, it would be easy to spot potential trouble. It almost takes the thrill away.

There were about fifty sockets and connectors on this board, only one of which gave me any trouble—and that was pure carelessness. I left the iron on a socket pin much too long. Some of the solder ran down and immobilized a spring contact that had to be able to flex in order to accept a pin from an IC. It took some reheating and probing with a bare wire to clear it out.

Saturday morning was spent installing IC chips and adjusting the controls on the disk controller board. Plugging in an IC chip is a snap—so to speak. The trick is to make sure all the contacts are lined up and extend straight down from the sides of the chip. The resounding snap that occurs when the contacts fall in place tells you when to stop pushing. Slow and easy does it every time.

The last disk controller board construction step was to install plastic circuit board lifters on the upper corners of the board to make it easy to pull out of the S-100 bus connector if it should ever become necessary.

A little side project followed in which a small circuit board was wired for later use in adjusting the controller board to match the disk drives. This board is used only once. It connects to the controller board through temporary clips just long enough to make an adjustment called precompensation. This regulates the spacing of pulses read from the disks so that all pulses are properly spaced for the computer disk reading system.

Some other temporary jumper wires are used to adjust a couple of small pots to bring board voltages to correct operating values. All boards, including the preassembled ones, have various DIP switches and jumper plugs that must be set for various operating options and system configurations; but instructions are easy to follow and setting the devices is no hassle.

And try it out!

After Saturday lunch, I was ready to find out if my latest soldering session had been successful. With the disk controller board plugged into the S-100 bus, and that dangling flat cable from the disk drives finally seated in its proper socket on the disk driver board, it was time to throw the power switch again.

This time, with the demo disk in drive A, the CRT came on with a slightly crooked set of lines that approximated a rectangle around the edges of the screen. The message it enclosed was readable, with options for viewing some screen artwork or running through some business tables and graphics. After admiring the display for a few minutes,

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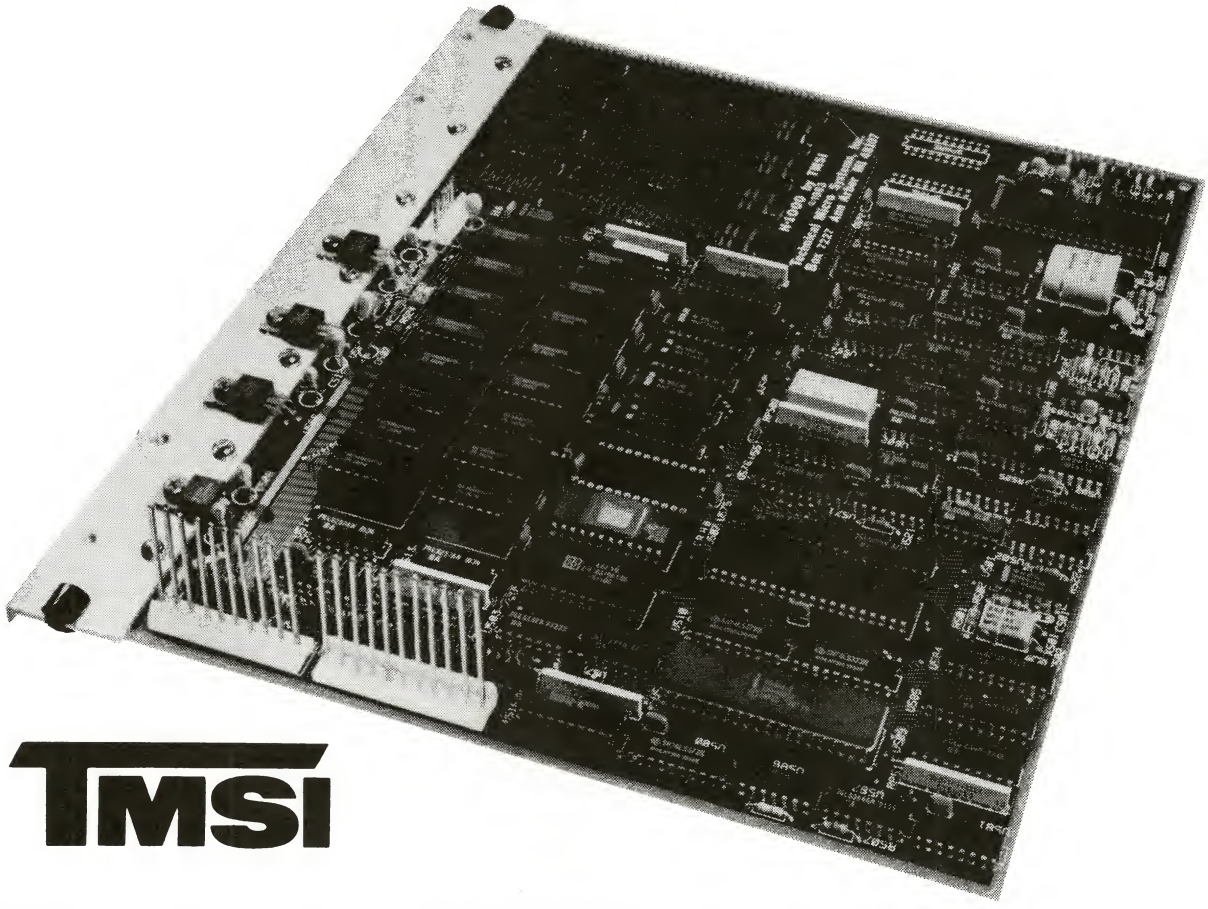

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I took a deep breath and forged ahead with the instructions for lining it up.

The CRT brightness I had already set. A couple of pots and a coil allowed adjustment of focus, height, and width of the rectangle. The yoke on the neck of the CRT was rotated slightly to line up the rectangle with the top and sides of the screen mask; and a rotatable eccentric ring on the yoke centered it. It was beginning to look great.

The final touch was to place a number of small plastic magnets. They go on about a dozen spikes sticking out from the tube neck—like the crown on the Statue of Liberty—to serve as magnet holders. Each magnet was then individually adjusted to positions closer or further from the tube neck (the closer, the greater its effect on the display) and rotated into a position that made right angles out of all rectangle corners.

This really didn't have to take long, but being a stickler for having the display perfectly centered and straight, I fooled around with it for half an hour. The results were indeed geometrically and esthetically pleasing.

The rest was anticlimactic. Two spring-loaded runners were installed along the upper edges of the chassis-spacer to clip into stud-footings on the cover, holding it snugly against the base. I cleared off a space on the workbench next to my new creation, got out a new package of 5.25 inch double-sided, double-density, soft-sectored disks, and listened to the disk drives click back and forth to each other as the various backup disks and working copies of Z-DOS, Z-BASIC, CP/M-85, and MBASIC were formatted and copied.

It was still only 3:25 in the afternoon. This real-time computer adventure had stretched over the better part of two-and-a-half weeks, but actual building time was a relaxing thirty five hours and forty minutes. And the dollar savings—by going the kit route—ran well into four figures.

During the two-week hiatus, I had scanned through the dozen well filled three-ring notebooks that had arrived in the first shipment, and they were real eye-openers. It seems quite likely there is no phase of microcomputing with the Heath 120 that isn't covered in detail. If you're interested in how computers are designed and how they work, there are reams of circuit diagrams and descriptive material.

The documentation that comes with each operating system (Z-DOS and CP/M-85) is presented logically, and is organized so you can just get a quick refresher (if you're already a pro); get a good working knowledge (if you're in between); or get a complete, detailed description (if you're a beginner). The same is true for the Z-BASIC and MBASIC books.

I'm not enough of an expert (yet) to critically evaluate all this documentation, but it's apparent I'll have plenty of spare-time reading for years to come. It's like opening the door of a large pantry and finding the shelves loaded with goodies.

I've already sampled a couple of the appetizers. The full-screen editing is a real joy. The freedom to run the cursor anywhere you want and make changes with single keystrokes almost makes you feel guilty. You're programming in Z-BASIC and you think you're running WordStar.

For the first time, I'm beginning to understand how operating languages and programming languages work together. In Z-DOS, there are a lot more commands available that are built-in so you don't have to keep switching disks to get that utility program you're after. If you're in Z-DOS, many of those utilities are literally at your fingertips.

It's much too soon, from my present perch on the beginner's end of the learning curve, to comprehend—much less try to describe—all the talents of this remarkable machine. And there wouldn't be room here if I could.

Suffice it to say, building the Heath 120 has been a delightful experience. The *real* adventure is just beginning.

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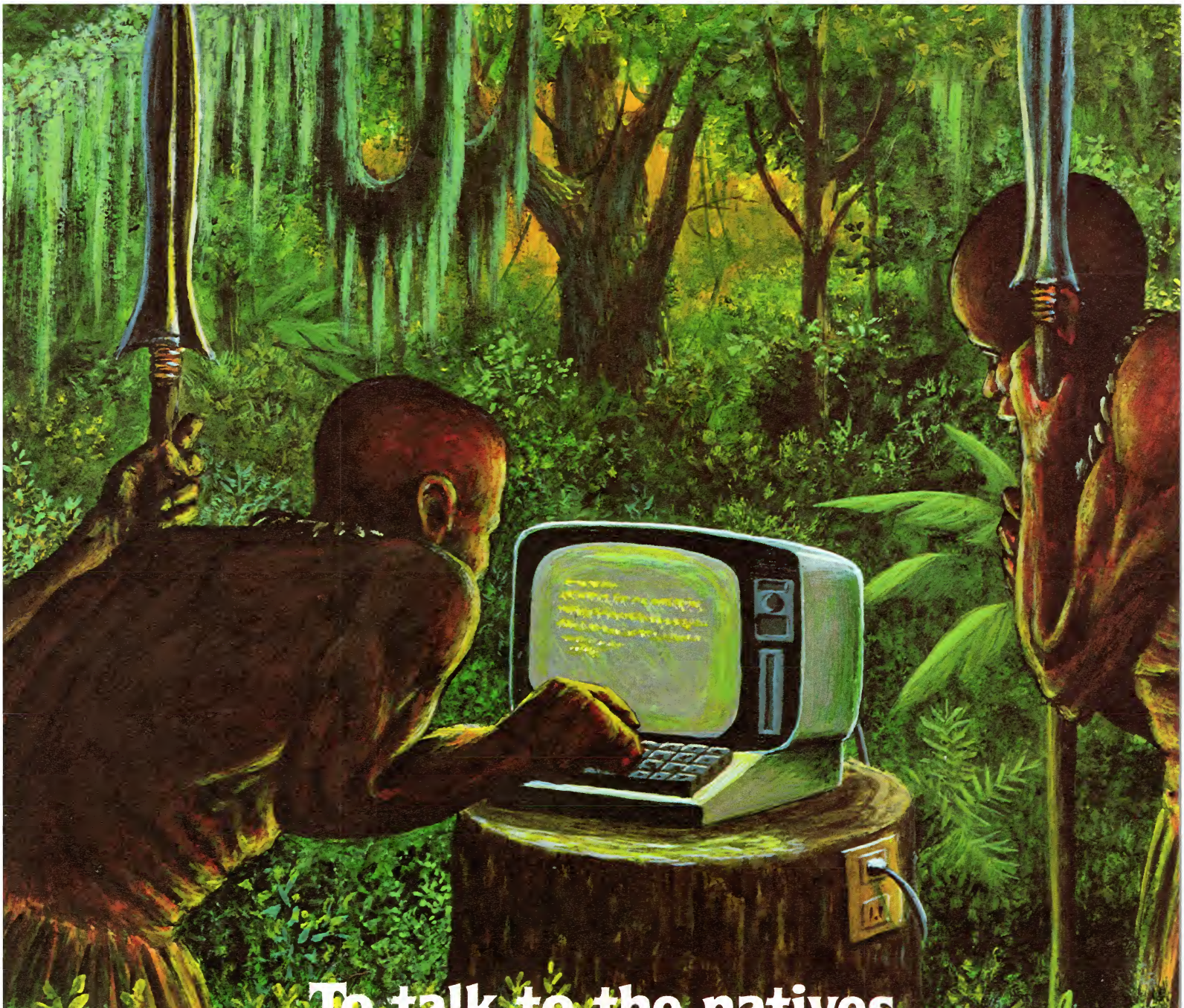

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A Human Factors Evaluation of the Z110

In a competitive market, a computer such as the Z100 will be judged on more than just its technical specifications. It will also be judged for how convenient and understandable it is to work with.

Richard M. Kane

Equipment should be designed to accommodate users.

Wherever a person must operate equipment, there is a potential for error in doing so. Consider the following scenario:

While driving in a foreign car, you decide to listen to music. So:

1) You grasp the left knob on the radio and rotate it clockwise. The knob rotates but you hear no music.

2) You discover that you've grasped the *tuning* knob instead of the ON switch. The ON switch for the radio in this foreign car is the one located on the right side of the radio. But after rotating the right side knob clockwise, you still hear no sound from the radio.

3) Finally, you realize that you must *push* the right side knob to turn on this radio. So you push it.

4) The radio is on now. It's on *loud* because you earlier rotated the right side knob clockwise and inadvertently set the volume up.

5) Now, startled, you reach to lower the volume. Being stressed from the loud sound, perhaps you reach for the left knob again before locating the volume knob on the right side.

Scenarios like the above are not unusual. Similiar events happen often and have given rise to the incorporation of human factors considerations in designing a wide variety of systems including airplane cockpits, nuclear power plant control rooms, and computers.

People have certain expectations concerning how some equipment operates. Past experience with similiar equipment can help to shape those expectations. Experience with many domestically manufactured car radios can reinforce the expectation that the left knob rotates clockwise for ON and to increase volume. A radio which looks similar to those we have operated, but operates differently, is likely to contribute to control errors. Further, those errors are likely to increase in a stressful situation, such as being exposed to very loud noise as in the example above.

The issue of consistency

Zenith's Z100 series of computers comes with both the 16-bit 8088 microprocessor chip and the 8-bit 8085. So both the 16-bit Z–DOS and the 8-bit CP/M operating systems can be used with the system. The advantage is obvious: this gives the user access to more software applications than would be available with either operating system alone -- thus increasing the computer's utility. But there is a tradeoff in providing both operating systems: different commands and/or command formats are sometimes used to accomplish the same thing.

For the user, switching between these different command requirements is likely to contribute to error. Appendix G of the Z100 User's Manual describes differences in commands between the two operating systems, but that description alone is not likely to prevent this type of error.

Perhaps another solution to this problem might involve some software between the user and the operating system. It could use common commands to accomplish functions common to both operating systems. There would, of course, still be tradeoffs: they might involve increased development time and system cost—and perhaps lengthened command-execution time, which in itself can be undesirable if excessive. If such a solution is not workable, then other reasonable solutions are worth seeking out because some users may have to move between operating systems. The differences which presently exist can be a source of annoyance and error to such a user.

As a case in point, a situation somewhat analogous to the car radio example exists in renaming files with Z–DOS (release 1.0) versus renaming files with CP/M–85 (version 2.2.100) on the Z100. Nearly opposite formats are used with respect to the position of the old and new filenames.

The format for Z–DOS is:

```
REN OLDNAME NEWNAME
```

But the format for CP/M is:

```
REN NEWNAME=OLDNAME
```

Both Z–DOS and CP/M are sold by Zenith to run on the Z100 series computers. Hence an individual computer can have two different command formats to rename a file. Such conflicting formats can be expected to cause more errors in using these commands than would occur if the formats were identical.

Furthermore, it is also possible that both formats may be used in the same session at the Z100 such as when copying CP/M files to Z–DOS readable format. So the user may need to switch between command formats within a session. Considering that these commands relate to whole files, which may be the result of days or weeks of work, mistakes have a potentially high cost.

On the positive side in this particular instance, neither Z–DOS nor CP/M destroys a file if the other's command format is used. Instead, an error message is provided. Nonetheless, such unsuccessful attempts at commands can frustrate the user and contribute to stress-related errors.

The Z–BASIC file renaming command format or syntax may cause further confusion. The order of the filenames is the same as for Z–DOS but Z–BASIC syntax also requires "AS" between the old and new filenames.

The format for Z–BASIC is:

```
NAME OLDNAME AS NEWNAME
```

If "AS" is used between the "OLDNAME" and "NEWNAME" when renaming files with Z–DOS, Z–DOS stores the file to disk with the name "AS". No error message is generated by Z–DOS to indicate this "user error." So the user has no feedback to indicate that the file was not stored to disk as "NEWNAME". This may go unnoticed until the user needs the file and discovers that there is no "NEWNAME" in the file directory. If the user's search for "NEWNAME" occurs long enough after the file naming session, the user may not be able to discern what happened to "NEWNAME". The user may thus be led to believe that the file must be recreated manually.

Though some of the software items mentioned above may have been developed by different organizations, Zenith sells all three for the Z100 under the Zenith label and even sells them together as part of a package. So as far as the end user is concerned, they come from one source. The user should be able to expect consistency. At the mo-

ment, however, microcomputer users must choose between consistency and and availability of software.

There are few if any microcomputer companies which can accurately claim to offer software which is consistent in its user interface across their software product line for any computer they sell. There are signs that the industry is moving in that direction. And if it does, those computers which are less consistent in their operation will likely be more difficult to learn, more cumbersome to operate, and more prone to user error than those with a uniformly consistent user interface. (I should point out that for the example given above, the BASIC–80 and Z–BASIC which Zenith provides use identical formats.)

Human factors considerations span a much broader range of issues than those highlighted above. But with this brief introduction to human factors, let's proceed to an evaluation of Zenith's Z100 microcomputer. Additional considerations should become apparent as you read. (And from time to time, I will mention some of the reference works relevant to points made here.)

A caveat

I should point out here that this is not a comprehensive evaluation of all Z100 models based upon experimental tests. Rather, it is the result of observations based on a few months experience with one configuration viewed with respect to human factors research and considerations.

The Z100 configuration evaluated is the Z110, the low-profile version. This version of the Z100 series has: 128 kilobytes of random-access memory (RAM); dedicated color video memory (which produces eight levels of intensity when used with the ZVM–121 monochrome monitor); two 5¼" double-sided, double-density disk drives with a capacity of 320 Kbytes per drive. This configuration is known as the ZF110-22. It was evaluated with the ZVM–121 monochrome monitor. (Further details on the computer, its keyboard, and the monitor will be provided below.)

This evaluation is limited to this particular configuration of the Z100. However, it has much in common with other configurations. The keyboard layouts are the same. The differences reside primarily in the number of disk drives (one or two); in whether or not color video memory is present; and in the monitor used (a separate monochrome monitor as evaluated here, a separate color monitor, or a built-in monochrome monitor). All of the Z100 series computers come with the "Z100 User's Manual"; and though manuals and software are not evaluated here, they are occasionally mentioned in discussing the hardware.

Finally, you should remember that this evaluation cannot include factors dependent upon your own individual workstation — such as the height of the keyboard from the floor, ambient lighting level, etc.

Some of the characteristics evaluated below may be more important to you than others. You will have to weigh their importance to you. This will in part depend upon what tasks you will perform with the computer.

I suggest that you pay particular attention to factors which will persist over the long term; because even minor advantages or problems with such factors will be realized again and again. I also suggest that you be aware of problems which may lead to severe errors even if they would be likely to occur only rarely. This latter category might include, for example, problems which could lead to hardware damage or, say, the accidental destruction of a file.

But human factors is not solely a matter of the design of the computer. For instance, if you find that you are not comfortable at your present workstation, you may wish to experiment to see if you can improve things. Factors which you might vary include: the position and intensity of lighting sources with respect to your workstation (for example, you may need to shade light from windows or re-orient the workstation with respect to windows); screen and keyboard position; leg room; chair factors such as seat height, seat angle, armrest height, and backrest angle; footrest

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height and angle; writing and working surface area; and accessibility of needed reference documents from the workstation. (In the references accompanying this article, K. H. E. Kroemer has a description of other important workplace variables.)

(For readers interested in pursuing the topic further, the reference list includes some general sources which may serve to familiarize you with human factors in computer systems. The article by Kroemer and another by H. L. Snyder provide clear discussions of human factors as they relate respectively to visual display terminal workplaces and visual display terminal standards. The book by A. Cakir, et al., gives a relatively comprehensive coverage for human factors for computers and terminals with some emphasis on office applications.)

Turning it on

Zenith provides unpacking and setup instructions and the manual gives disk handling instructions before asking the user to handle the disks. The power switch is located on the rear of the computer. One justification heard for this switch location is that it prevents inadvertent switch actuation. However, a switch used as frequently as the power switch should be located where it can be seen—rather than being hidden behind the computer among the power cord and other cables. To prevent inadvertent actuation, a channel guard or other protective measures can be used.

(There are, however, other considerations involved—such as the location of the power supply and the need to provide shielding for the power cables. However, that would not prevent other alternatives from being investigated. For instance, with a suitable switch guard, the switch might be located on the *side* toward the back, close to the power supply.)

Appropriately, you move the two-position rocker-type power switch *upward* for ON and *downward* for OFF. Several cues indicate that the Z100 is ON. The switch snaps into the ON position with an audible click and the Z100 sounds a beep. Throughout operation, a red light on the reset key indicates power ON.

Fan noise presents another, perhaps unintentional, cue to operation. The Z100 fan exhaust is at the rear so it isn't likely to blow at you or at papers on your desk. When you turn on the Z110, the fan noise is noticeable. It registered 53 decibels (dB) on a sound-level meter held where the user's ears would be. The measurement was made in an otherwise quiet, carpeted, 11 x 18 x 8 ft. room with plaster walls and ceiling. The Z110 was on a table about six inches in front of a wall and about two feet from a corner of the room.

Where you place the computer will make a difference in how obtrusive the noise is. In the room described above, the fan noise interferes slightly with the user's normal conversational listening. In an office with a higher ambient noise level, the fan noise should be less noticeable. The Z110 configuration tested did not seem to produce excessive heat exhaust from the fan opening.

There is also the question of automatic bootstrapping.

Appendix B of the CP/M–85 manual for the Z100 gives instructions on the automatic bootstrap procedure wherein a system disk is placed in a disk drive before turning on the Z100. However, page 1–5 of the same manual clearly states under "Floppy Disk Handling Precautions," that you should "Never put a disk into a drive unit before turning on hardware equipment....". These conflicting sections can cause some consternation concerning automatically bootstrapping the Z100.

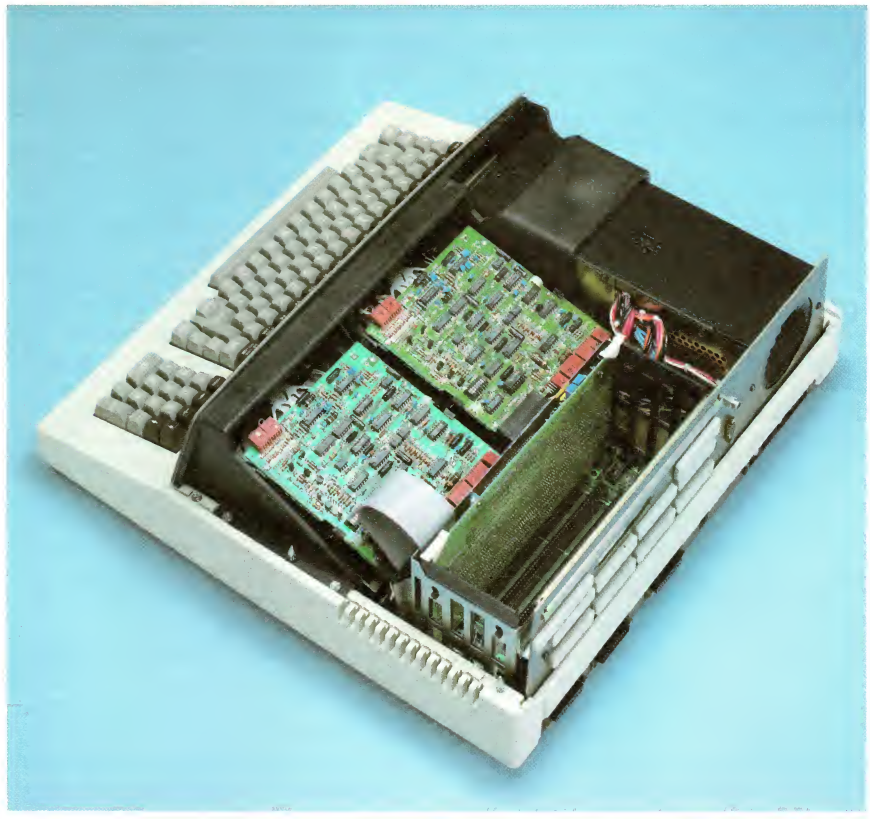


Photo Courtesy of Zenith Data Systems

Figure 1: An overhead view of the Z110 with the cover removed. The circuit cards visible here cover the 110's two disk drives. Behind them (lower center, here), there is room for four IEEE-696 S-100 bus circuit cards in addition to the disk controller card supplied with the unit. The cabinet back includes an ample supply of capped openings for input/output connections to such optional circuits. Below these openings are the three connectors J1, J2, and J3 for the DCE serial port, the DTE serial port, and the parallel port.

Photo Courtesy of Zenith Data Systems

Figure 2: The Z100 keyboard.

User expansion

The Z110 top is easily removed or replaced in a few seconds without tools. Inside, S–100 circuit card insertion slots are immediately accessible. The S–100 connectors are offset inside their card cage so that S–100 circuit boards added here can't be installed backwards. The Z100 manual describes the video board, the central processor unit (CPU) motherboard, and the disk controller board as being user-configurable. Access to the switches specified in the manual for the latter two boards is relatively easy.

But with the Z110 top removed, I could not visually locate the video-board

jumpers described in the manual. So some involved disassembly with tools may be required if you wish to access these jumpers. Similarly, though the Z100 has room on the CPU motherboard for an additional 64K of RAM, I could not see vacant chip sockets on the motherboard. So some involved disassembly may also be necessary if you wish to add that additional memory.

The Z100 comes with 128K of RAM and is expandable to 768K RAM. Having sufficient random-access memory is a positive human factors attribute. It allows you to stay task-oriented rather than having to delay a task—for example, to access or change disks.

Amount of memory can be evaluated in a relative or an absolute sense. If a microcomputer's usability is evaluated in an absolute sense, then it is clear that more memory can allow software which is more user-oriented. Having more memory allows sessions which seem more natural and which are more productive than those possible with lesser memory resources. In a relative sense, the Z100 memory capacity is an improvement over earlier microcomputers and is comparable to other microcomputers of similar price range introduced at the same time.

Interfacing to peripherals

The number and types of connectors which come as standard equipment on the rear of the Z100 series allow the user some flexibility in interfacing the computer to peripheral devices such as printers and modems. There is a parallel port, one Data Computing Equipment (DCE) serial port, one Data Terminal Equipment (DTE) serial port, a connector for an eight-inch floppy-disk drive, a light-pen connector, a composite-video connector (only on the low-profile model), and a Red-Green-Blue (RGB) video connector. The Z100 User's Manual identifies all connectors and provides a description of the individual connector pins used on the RGB connector.

Present labelling for connectors on the Z100 itself takes the form of "J1", "J2", etc. More descriptive labelling on the Z100, such as "DCE Serial Port," "DTE Serial Port," and "Parallel Port," would be an aid in interfacing peripherals. This is particularly desirable in these three cases since they each use a 25-pin connector; although a female connector is used for J1 (the DCE serial connector) and the parallel port, while a male connector is used for J2 (the DTE serial connector). In some cases, additional labeling may not be practical — as with the 10 precut plastic capped openings that allow addition of more connectors in the future.

Regarding the importance of labeling, it is particularly noteworthy that it is possible to switch connections to the DCE serial port and the parallel port since these ports use physically identical connectors. Because of different voltage levels used at these ports, such a wrong connection could cause electrical damage to the computer and/or peripherals. Labelling alone would not obviate this type of error. It could be prevented by the use of physically different connectors for the parallel port and the DCE serial port.

The Z100 operating systems (Z-DOS and CP/M) provide a "CONFIGUR" program that leads the user step by step through the process of attaching a peripheral to the Z100. The program allows you to select preset configurations for certain peripherals. It also allows users with other peripherals to specify interface parameters such as baud rate, handshaking, parity, and others. Then the program draws a picture of the rear of the Z100 computer and indicates the port where you should plug in the peripheral.

Switch settings for the printers listed in the CONFIGUR program are given in the Z100 User's Manual so that you can set them appropriately.

The CONFIGUR program is a big step in the direction of ease of setup and operation. It is, however, limited to certain brands of peripherals. For a brand not covered by CONFIGUR, the user would have to know additional details—most notably the use of the individual contact pins on the serial and parallel ports. And while the serial port contact pins are generally standardized, there is a wider difference among brands on how they use the parallel-port pin contacts.

In the Z100 User's Manual index, looking under "configuration," "interface," "parallel," "serial," "port," and "peripheral," I could not find any description of the individual contact pins for the parallel or serial ports. That information would greatly assist successfully interfacing the Z100 to peripheral devices not covered in the CONFIGUR program.

However, even when you choose the preset configurations, the program leaves you in doubt concerning some of the specific parameters which are being selected. Also, the program does not allow you to display the current configuration of a given port.

These capabilities could be useful. For instance, much trial and error may be necessary in configuring a device (a speech synthesizer, for example) if it is not covered by CONFIGUR. This could be due to having insufficient information from the manufacturer of the peripheral device. Or it could be due to lack of information on the Z100 parallel and serial port contact pins mentioned above. After succeeding though, say with the Z-DOS CONFIGUR program, you may wish to duplicate your success by similarly configuring CP/M to work with the peripheral device. Unfortunately, you may have to start from scratch again, because you can't display the configurations currently being used. Hence, having the capability to display current configuration parameters would be an improvement.

These concerns with configuring peripherals may not be relevant if you are attaching one of the peripherals for which the preset configurations are provided. That is, for peripherals listed in the CONFIGUR program, you probably will not need to know about contact pins. CONFIGUR prompts you to select the configuration for your peripheral, and indicates where it should be plugged in.

However, for users of peripherals not covered in CONFIGUR, there should at least be some indication of what information would be needed and where it might be found.

The ZVM–121 Monitor

Generally speaking, the ZVM–121 produces clear and easy to read characters. However, there is still room for improvement. (For instance, more information on its placement could be provided. Additionally, a primary improvement on the monitor would be to make it adjustable for viewing angle.)

The ZVM–121 monitor's brightness and contrast thumbwheel controls are located in the front and near the bottom of the monitor in a recess so that they are accessible while being unlikely to be inadvertently moved. They are also serrated to aid in adjustment.

The monitor's ON-OFF switch is located on the right front side of the monitor and is labelled as such. This two-position rotary switch appropriately rotates to the right to activate the monitor and to the left for OFF. However, the ON and OFF positions are not indicated by labels or reference lines and there is no light to indicate ON. Thus, the monitor can be left on without notice. At a minimum, the switch should be provided with labelled position indicator lines for ON and OFF.

A rotary switch is generally not recommended for speed for a two-position function such as ON-OFF. Here however, since speed of operation is not critical and visual identification of control position is important, a properly labelled rotary switch is acceptable. But at 1.4 cm (9/16 inch), the flat portion which is to be grasped is smaller than the minimum 2.5 cm (1 inch) length recommended for ease of use. (For more information on the design of hardware controls, see Chapanis and Kinkade; and the Defense Department's human engineering design criteria.)

Regarding the monitor's positioning, the Z110 unpacking instructions contain a warning not to put the monitor on top of the computer in "normal use." Thus, there is a tacit message that you can put it there during "non-normal" usage. (In fact, some Zenith photos show the monitor atop the computer.)

There is no indication in these instructions of what will happen if you do put the monitor on top of the computer. No reason is given for why it should not be placed there.

Is it due to the strength of the cover? If so, a stand of some sort might suffice by bridging the computer to support the monitor. Is it due to the monitor's electromagnetic field being too close to the disk drives? If so, a stand may not be appropriate because it may not provide adequate electrical shielding if close to the computer.

If it turns out that the ZVM–121 actually can't be placed above the Z110 (even on a stand), then placement is most practically limited to its left or right side. This limits placement options and may thus make it difficult to adapt the system to small workspaces or user preferences.

The ZVM-121 monitor is not adjustable for viewing angle. While it can be moved in a horizontal plane by sliding the cabinet, there is no way provided to swivel it on its base or to tilt it. Such a capability would make the monitor more adaptable to users of different heights — as well as for workstations which have fixed sources of glare. The ZVM–121 appears to have no apparent glare-reduction treatment such as screen etching. And I found no reference to any such treatment in the ZVM–121 manual or descriptive literature. (I should note here that the all-in-one model of the Z100 has a screen which has non-glare treatment.)

Screen reflections can often be reduced by modifying light sources, shielding the screen from the source of glare, or adjusting the screen. So a screen filter is not mandatory. (And in fact, it must be very well chosen. Both Cakir, for instance, and Snyder found that a screen filter can decrease image quality.) Again, the ability to tilt and swivel the screen can be a partial aid in reducing glare which cannot be eliminated through other techniques.

The ZVM–121's active (character-bearing) screen area is about 21 x 17 cm (8.25 x 6.5 inches) horizontally x vertically. The configuration evaluated here can individually address 640 dots horizontally and 225 dots vertically on the monitor. The ability to address individual dots provides flexibility for the user in designing and using displays. However, the ease with which these can be done is highly dependent upon software and thus cannot be evaluated here.

Upper and lower case characters are provided in an 8 x 9 dot matrix format (horizontal x vertical) but characters actually use a 7 x 8 dot matrix (H x V) because horizontal spacing between characters equals one dot as does spacing between lines. The dot matrix size is larger than the 5 x 7 matrix (H x V) recommended as the minimum for good legibility. The intercharacter and interline spacing is also adequate (one dot is recommended).

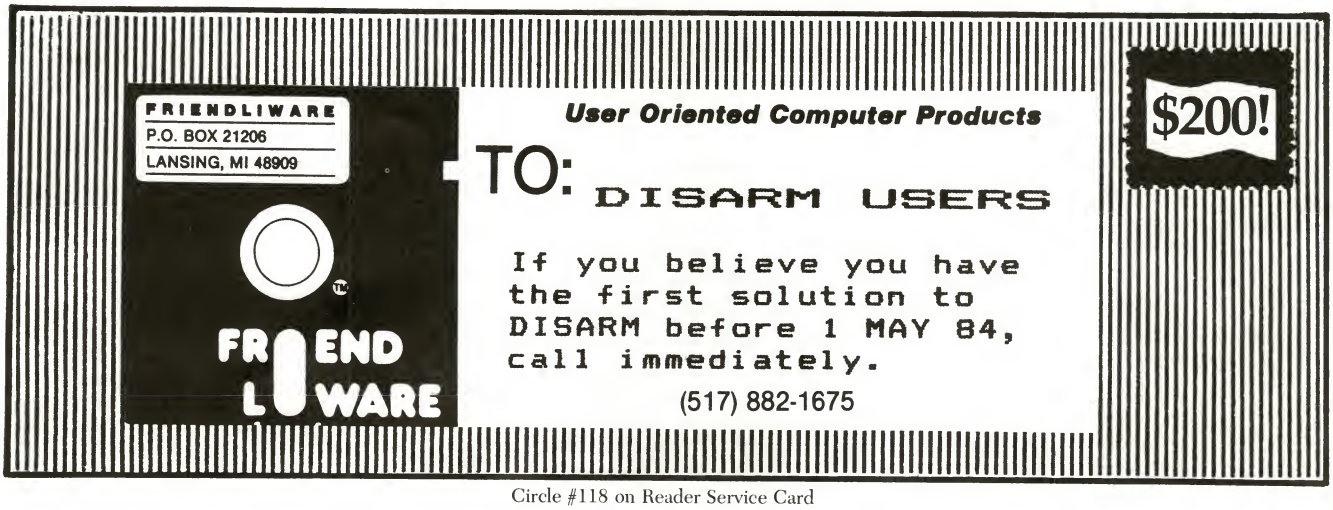
Item	Recommended	Z100	Comment
Key travel	.31–.64 cm	.4 cm	Good
Key force	.9–5.3 oz.	3 oz.	Good
Keyboard slope	11–15 deg. (12 deg. optimum)	12 deg.	Good
Home row key height	3–5.1 cm (from desk top)	7.5 cm	Too High
Key top	Concave (2.5 cm radius)	Yes	Good
Key legends	Clear and distinct	Yes	Good
Key finish	Nonglare	Yes	Good
Color code	To separate alpha and numeric keys or special function keys	Special function keys and others are brown (see text)	Color coding scheme is not completely clear
Alpha and numeric key size	1.2–1.5 cm	1.2 cm square	Good
Special function key size	2.5–3.8 cm	1.2 cm square	Tradeoffs include key layout, number of function keys and interkey space
Key spacing (center to center)	1.8–2.0 cm	1.8 cm	Good
All key separations	.6 cm	.6 cm (Except shift keys)	Shift keys are the only exception

Table 1. Some evaluation criteria and the Z100 keyboard. (Recommended values adapted from Diffrient, *et al.*; and Cakir, *et al.*; see references.)

The screen has 24 lines plus a 25th user information line which can display, for example, mnemonic labels to cue the operator regarding the current use of the special function keys. These labels are an aid when designing or using programs with customized function keys.

Some researchers have investigated the effects of particular type fonts used in screen displays. So it is an advantage that this is a feature of the display that is accessible to modification by software if desired.

Regarding size, characters are about 0.51 cm (0.2 inches) high. Assuming a maximum viewing distance of 71 cm (28 inches), a 0.51 cm high character subtends an angle of about 24.6 minutes of arc at the observer's eyes. This is well above the 18 minutes of arc recom-



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mended as the minimum for characters on a monochrome display for good legibility.

There is next the question of regeneration rate—how frequently the image on the screen is refreshed. Persistent flicker is at least an annoyance to the user. A display which is too infrequently refreshed will appear to flicker. The ZVM–121 uses a regeneration rate of 60 Hz. In the configuration evaluated, the image on the monitor appeared flicker-free.

However, user perception of flicker can be affected by many other factors: including the CRT's phosphor light wavelength and decay rate; display brightness; and factors in the application environment such as room lighting.

Likewise, image stability can be negatively affected by factors such as power inconsistencies or inadvertently exposing the system to static charges. The image on the evaluated ZVM–121, however, appeared stable at all times.

Color is also a factor. The ZVM–121 tube phosphor produces a green image.

The color of a monochrome display is the result of the eye's integrating the various wavelengths of light emitted by the CRT phosphor. If important factors such as display luminance, luminance contrast, and regeneration rate are held constant, then color is not critical and can become a matter of personal preference. However, the eye adapted to normal light is more sensitive to light in the yellow-green part of the visible spectrum. Therefore, a given luminance can be achieved with less energy for colors in that range. Also, the appearance of visual sharpness is better in the yellow-green part of the visible spectrum than it is at the ends. Thus, the green image produced by the ZVM–121 is within the range of colors generally recommended. (J. D. Gould, by the way, has written a good summary of visual factors in computer terminal displays. It's in the reference list.)

The keyboard

The keyboard layout and key design are generally good. But the keyboard is part of the 40-lb. computer unit, which some users may find inconvenient.

The alphabetic keys conform to the QWERTY layout, referring to what the first six letters in the top row of this layout spell out. While human factors researchers have studied and proposed other alphabetic key layouts, QWERTY is a de facto standard.

However, users are not limited to the QWERTY layout. The ALTCHAR.SYS files which come with Z–DOS and CP/M allow you to reprogram the keyboard to reproduce ones used in other countries. This also makes it possible to develop software to produce keyboards aimed toward greater typing efficiency than the QWERTY layout. However, the latter may require more information than is given in the manuals.

The keyboard is not detachable from the 40-lb. computer unit. This discourages movement of the keyboard (and attached unit) to achieve other than gross positioning. For further positioning and comfort, it may be easier to move your chair or assume an uncomfortable posture. Aside from being inconvenient, moving your chair may cause your relationship to other workstation elements, such as the CRT and desk, to become sub-optimal. Any discomfort resulting from improper posture at the console is especially undesirable for tasks involving long sessions at the keyboard — such as with data input or word processing. A detachable keyboard could help to obviate these problems. It could also eliminate the necessity to have the computer occupy only the part of your workspace directly in front of you. A detachable keyboard could also more readily incorporate means for the user to adjust keyboard slope and height for greater comfort.

Moving the keyboard can also reduce glare from glossy keytops. This might seem to be more a matter of convenience than necessity. But Cakir has pointed out that even touch typists require greater visual reference to the keyboard than to a typewriter. This is due to the more abstract nature of computers, where mistakes in actuating function keys can have serious consequences. He has reported, for instance, surveys of users where subjective ratings of frequency of neck pains, fatigue, and headaches were shown to be lower for matte keys than for glossy keys. These symptoms can arise when users must change posture to read keys when there is glare from keytops.

On the Z100, positive steps have been taken to reduce keyboard glare. The area surrounding the keyboard is matte finished, as are the keytops. Keys are neutrally colored either brown or grey and contrast well with the surrounding area. Zenith's care in designing these aspects should help contribute to user comfort. Keytops also have a non-slip surface. Key labels are generally explicit and the use of unstandardized symbols has been avoided.

The keyboard has an audible click (beep) to provide feedback indicating successful depression of a key to the user. The audible click may be turned off by software, although I could not find how to do this in the manual. The ability to have the audible click is desirable and can reduce undetected keying errors. However, the ability to quiet the keyboard if desired is also a plus.

Table 1 shows some human factors specifications for keyboard design which are used here as evaluation criteria. In the table, the Z100 keyboard is compared to the criteria. It should be noted that specific values of evaluation criteria may differ somewhat from one reference work to another. There is debate on some points and researchers are refining data. So use the table only to obtain a general picture.

As you can see from the table, the keyboard meets most criteria. In terms of individual key design, the keyboard is generally good. The most notable of the items which do not meet the tabled criteria is the high keyboard height. This, combined with a shallow 1.8 cm palm rest, can contribute to an uncomfortable wrist angle at the keyboard.

The reason why certain of the dedicated function keys such as D CHR (delete character) are brown while others with similar functions such as DELETE are grey is not entirely clear. Keys with brown color coding include all special function keys, most cursor control keys (all except line feed), some editing keys, and the RESET key. What these brown keys seem to have in common is that all but one of them are on the top row of the keyboard.

Table 1 indicates that keytops are appropriately concave in shape. The "F" and "J" keys are more deeply concave than others to facilitate locating the home row for touch typists. Likewise, the "5" on the numeric keypad has a dimple in its center to mark the center of the numeric key area.

There are 13 brown special function keys located on the top row of the alphanumeric section of the keyboard. Their function can be tailored for special purposes in programs. These are labelled "F0" (F zero) through "F12". Labels beginning with "F1" rather than "F0" would be more appropriate for most users.

Also, the 13 special function keys are part of a straight row of 16 brown keys with equal spacing between them. Grouping the special function keys into smaller groups of perhaps three to five keys each can help the user to more quickly and accurately locate a given key, particularly when the key is not near an end of the row. Grouping may be accomplished, for example, through the use of shading or demarcation lines. Grouping could even be done by physically separating these keys into subgroups — although changing spacing would require other changes in the keyboard's layout.

As indicated above, in addition to the special function keys, the keyboard contains keys which have dedicated functions. Several of these are discussed below.

Dedicated function keys

It is a good rule that critical keys should be positioned separately from more frequently used alphanumeric and function keys. In this regard, the Z100 positions the RESET key, for instance, in the extreme upper left of the keyboard. By depressing RESET simultaneously

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with the CTRL (control) key, located three rows below and one row to the right, you cause the computer to return to the power-on state. The location of the RESET key combined with the fact that it must be used in conjunction with the CTRL key are guards against accidental activation.

(I should note that by "critical" keys, I mean mainly those whose misuse could be catastrophic—such as RESET. One questionable case of key placement on the Z100 is having the delete character key immediately next to the delete line key—both upper case. The potential for accidentally deleting a line rather than a character is more likely to produce an annoyance than a catastrophe, however.)

The keyboard has a HELP key to provide simple access to assistance for users. What you get by pressing HELP is dependent upon the program you're using. For example, some programs may simply present a list of available commands while others may provide textual descriptions of available commands. Some programs may not use it at all. But the capability is there and including a HELP function key is commendable.

Useful editing keys on the keyboard include I CHR (insert character), D CHR (delete character), INS LINE (insert line), DEL LINE (delete line), and DELETE. The Z100 manual states that DELETE often duplicates the BACKSPACE key but is sometimes used for other purposes. This, of course, is mainly a result of how different programs use these keys. However, it's not clear that there is any need for a key which duplicates BACKSPACE. Further, since a dedicated function key has a specific label, using it for other purposes can be confusing. One of the other purposes of DELETE is to abort an automatic booting of the system on power up. Since the stated function of the BREAK key is to interrupt program execution, the BREAK key seems like a more logical choice to abort an auto boot.

The CAPS LOCK key affects only alphabetic keys by converting them to upper case when it's depressed. This key is a push-to-latch, push-to-release type which stays depressed 3 mm to indicate activation. So the user can visually or tactually determine whether CAPS LOCK is in effect. A small light on this key would provide a more apparent visual indication of this.

If you hold down an individual key (except the SHIFT or CTRL keys), it will repeat at the rate of 11 keys/second. If the FAST REPEAT key is held down at the same time as another key, the repeat rate is 28 keys/second. This feature is particularly convenient for rapid cursor positioning.

And the numeric keypad

To facilitate entering substantial amounts of numeric data manually, the Z100 has a numeric keypad. This keypad layout is a 3 x 3 matrix of the numbers 1 through 9 where 7-8-9, 4-5-6, and 1-2-3 respectively are on the top, middle, and bottom rows of the matrix. The 0 (zero) key occupies the two spaces below the 1 and 2.

This layout is similar to that used on many calculators except that on calculators the 0 commonly occupies one space below the 1. For numeric keypads, some researchers (Cakir, for instance, and Seibel) advise the use of a telephone style layout with the numbers 1 through 9 forming a 3 x 3 matrix with 1-2-3, 4-5-6, and 7-8-9 respectively, occupying the top, middle and bottom rows, and the 0 below the 8.

There is still debate over whether the calculator or telephone style layout is superior in terms of the layout itself. about equally well with either layout. Part of the rationale for using the telephone style layout is for compatibility with telephones since they are often used in conjunction with computers — and indeed are often part of the computer workstation as when they are used with modems.

As with the earlier radio example, incompatibility here could be expected to contribute to user error. That is, it is not advisable to have users alternate between different layouts. Also, R. Seibel has shown evidence that the telephone style layout is faster and more accurate for low-skilled users. However, if you use a calculator extensively, the calculator-style layout may serve you better. (Seibel's chapter noted in the reference list gives a lucid review of data entry with 10-key keypads and of keyboard input in general.)

In summary

Like anything else, the Z100 has a mixture of positive and negative human factors. There is certainly a lot of good about it. And with corrections of problem items such as those discussed above, its "human interface" can be improved. Certain improvements are as simple as providing the user with additional information. However, other possibilities could involve physical change—such as if a detachable keyboard were provided. If changes are made, there are many current characteristics which will hopefully be retained—such as the positive aspects of the keyboard discussed above.

However, users and prospective users must make their own final evaluations of the Z100 in comparison with other similar products. They will compare not only human factors in the computer itself, but also price, reliability, power, and software availability.

I've tried to present a balance of some of the noteworthy facts, pointing out well designed human factors attributes of the Z100 as well as some aspects which can be improved. But many more points and details could be addressed if space permitted. I certainly encourage you to try out the Z100 computer yourself before making any final judgements. Factors other than human factors will also play a part in your final assessments. How you will weigh these factors will be based in part upon your knowledge, requirements and preferences. To the degree that you're more aware and knowledgeable of what to look for in terms of human factors, your evaluations and decisions can include these important factors.

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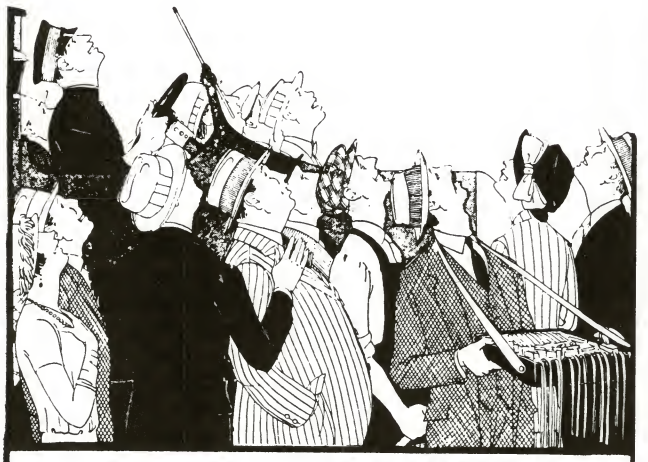

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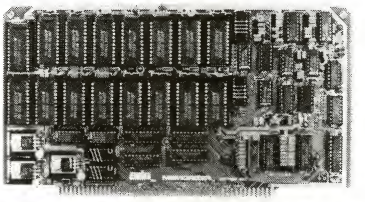

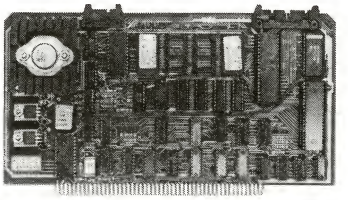

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Z100 Software Roundup

During its first year, the Z100 has acquired a very respectable base of software written or customized for it.

Frederick Zimmerman

"Without software, it's just a paperweight," says the motto on The Software Toolworks' popular T-shirt.

A computer is only as useful as its programmed instructions, or software. With the appropriate software, a computer can perform many useful applications: word processing, financial analysis (electronic spreadsheets), data base management, home entertainment, computer-aided instruction (CAI), and more.

That's why *Sextant* decided to conduct a survey of the software available for Heath/Zenith's H/Z100 computers. In February, we began writing to the various companies which make software products for the H/Z100. We placed a notice in *Buss: The Independent Newsletter of Heath Co. Computers*, and mentioned the survey in a letter sent to every company which was on our mailing list as a potential entry in *The Buss Directory* of Heath/Zenith suppliers. We asked for promotional literature, documentation and, wherever possible, review copies of the software itself.

We've been very gratified by the response to our survey. As of June 7, we'd received information about more than one hundred programs for the H/Z100. Many of those companies were able to send us review copies. Thanks!

The following survey includes only those programs which are H/Z100-specific. That is to say, 1) programs designed to run under the Zenith Disk Operating System (Z-DOS) or 2) programs written to run under Digital Research's CP/M operating system which were written to take advantage of the H/Z100's special function keys or its graphics capabilities. Therefore the survey does not include all the hundreds of CP/M programs which can run under CP/M-85 but are not customized for the H/Z100. For example, the survey doesn't include Hoyle and Hoyle Software's "Experience" Adventure-style games, nor does it include Evryware's popular arcade-style video games. Since we are focusing on programs written specifically for the H/Z100, the following survey is a good measure of how "fruitful" the H/Z100 has been in its first year of availability. On the whole, we have been pleasantly surprised by the diversity of software which has been developed for the H/Z100.

In the following survey, we'll try to summarize the pertinent information about each program. We will use a standard format for each software description.

Software description format

Program Name
Price; supplier
Hardware Requirements: What is the minimum combination of random-access memory (RAM), disk drives, and other hardware devices which are necessary to run the program?
Operating System: Under which disk operating system does this program run?
Software Required: In order to run the program, do you need any other software—programming languages, device drivers, text editors, and so forth?
Description: What is this program supposed to do? And for whom? A brief answer.
Features: What special capabilities distinguish this program from other programs which have the same function?
Documentation: How much explanatory text is provided with the software? Are there indexes, glossaries, or other reference tools? How easy is it to understand the documentation? How comprehensive does the documentation seem to be?
Performance: How powerfully does this program perform its designed function? In other words, how efficient, convenient, and flexible is it? How fast does it operate? Is there a noticeable lag between the moment when you enter a keyboard command and the time when the program carries that operation out?
Ease of Use: How difficult is it to learn the basic operations of this program? How much help does the program provide the new user?
Other comments: Anything else we happen to know about this program.

Ordering information will be found at the end of this special section.

Organization

The H/Z100 programs are organized into twelve categories:
—Systems software (operating systems and emulators)
—Editors, etc.
—Accounting
—Spreadsheets
—Data base management systems
—Utilities
—Programming languages & language utilities
—Communications
—Graphics editors
—Home use
—Entertainment
—Miscellaneous

Within each category, programs are separated into three groups:

We have tried out these programs.

We have tried out these programs and verified that they do indeed function on the H/Z100. Wherever possible, we have tested the program's major features, but a caveat is in order here: we did not have time to do a comprehensive or systematic study of every program.

We have received detailed literature about these programs.

By "detailed literature", we mean extensive technical information (sometimes including the documentation) describing the operating features of this program. In some cases, we received review copies of the software but were unable to test the program's operation for some reason: for instance, because we didn't have the appropriate hardware.

We have received general information about these programs.

Advertisements and press releases are included in this category.

Systems Software

A disk operating system (DOS) manages the interaction of the computer's central processor unit (CPU) with its resources, such as disk storage devices, random-access memory (RAM), printers, and so forth.

The DOS enables you to send program or data files from memory to disk (or vice versa). In the same fashion, you can copy files from one disk to another. If a disk is approaching the limits of its storage capacity, you can make room by deleting files. The operating system can give you a directory of all the files on a disk, or all the files whose names begin with, say, the letter Z, or all the files which end with a given extension, such as .TXT. These file management functions are the most important elements of a DOS.

In addition, the Z–DOS and CP/M–85 operating systems come equipped

with a number of useful utility programs:
—To do rudimentary text editing ("line editors").
—To format new disks.
—To create executable object files from assembly language source code.
—To link two or more object code files into a single file.
—To execute "batch" files of DOS commands.
—To help debug machine language programs.
—To "map" logical devices to physical devices, a procedure which enables you, for example, to tell Z–DOS that it should go to the physical right-hand disk drive when it wants something from logical disk drive A:.
—To configure the operating system to work in conjunction with a particular brand of printer, modem, or other input/output (I/O) device.

In addition to operating systems, there is another class of programs which falls under the heading "systems software": operating system emulators. For example, the Heath Users' Group's HRUN is a program to emulate the Heath Disk Operating System (HDOS), which runs on the H/Z89 and H8 computers. These emulators are programs which run under one operating system, but simulate all the functions of another. Since some programs are only available for one operating system, this can sometimes enable you to run programs which are not normally available for your operating system.

We have tried out these programs:

CP/M–85
$150; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Description: CP/M–85 is the version of Digital Research's operating system which supports execution of programs running on the 8085 central processor unit (CPU) which makes up the 8-bit half of the H/Z100's dual processor.
Features:
—CP/M (Control Program/Microprocessor) was designed to make applications programs portable across a variety of different microcomputers. If you buy a program written for CP/M, you can be confident that the fact that the program was written on another brand of computer will pose no barrier to its operation on your microcomputer. There is a very large pool of software available for CP/M.
—You may assign certain files for access to certain user numbers. This is especially useful when using high-capacity hard-disk systems. (This is not a Z–DOS feature.)
—You can run most of your old CP/M 2.2 programs for the H/Z89 on the H/Z100 with CP/M–85, but your CP/M 2.2 disks must be soft–sectored if you are to run them on the H/Z100. *Sextant*'s Reader Profile indicates that about one-fifth of our readers own or use soft-sectored 5¼" disk systems (excluding H/Z100 owners).
Documentation: Two volumes, about 510 pages, in two Zenith Data Systems three-ring binders. Heath/Zenith Data Systems wrote Volume I (about 290 pages), which includes a CP/M Reference Guide. Digital Research provided Volume II (about 220 pages), which contains technical material intended for programmers (and written in Digital Research's typically cryptic style.)
Performance: One minor point is that CP/M–85 seems to boot a few seconds faster than Z–DOS.
Ease of use: The CP/M family has been criticized for its lack of "user-friendliness." Digital Research's documentation is difficult to understand, and CP/M's error messages are often vague and unhelpful.
Other comments: CP/M–85 makes available a larger Transient Program Area than CP/M 2.2, its predecessor for the H/Z89. That's because there is only a "stub" of CP/M–85 on the 8085 side of the H/Z100. Most of the operating system runs on the H/Z100's other CPU, the 16-bit 8088.

HRUN
$40; Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM. Compatible disk transfer media (see *Performance*, below).
Operating System: CP/M–85
Description: HRUN is a CP/M program that emulates the Heath Disk Operating System (HDOS).
Features:
—Virtually any HDOS program that is not hardware-dependent can run under HRUN, including HDOS Microsoft BASIC, Benton Harbor BASIC, the HDOS Editor and Assembler, and Heath Users' Group debugging programs such as ALDT and RDT.
—HRUN supports nearly every HDOS system call and H17 read-only memory (ROM) call.
—HRUN also maintains many of the memory tables that "real" HDOS uses, such as the Channel table, the Device table, the Active I/O table, and the System Date.
Documentation: 21 pages.
Performance: In order to transfer HDOS programs to the HRUN format, you will need to have compatible disk media. HDOS 5¼" disks are generally hard-sectored, single-density, and single-sided, whereas H/Z100 CP/M disks are usually soft-sectored, double-density, and double-sided. You can select the density and the number of sides from CP/M–85's FORMAT program. Since you don't have a hard-sectored controller for your H/Z100, you can't read hard-sectored HDOS disks. Fortunately, there are other alternatives.
Ease of Use: It took me about two hours to get the first HDOS-like > prompt to appear on the H/Z100 screen. HRUN does require a fairly sophisticated knowledge of HDOS and CP/M, as well as familiarity with the various disk formats for the H8 or H/Z89 and the H/Z100.
Other comments: HRUN was written by Pat Swayne, HUG's software engineer.

TCS CP/M Emulator
TCS Software
"Price varies by dealer." When the Emulator was announced in issue 58 of *Buss: The Independent Newsletter of Heath Co. Computers*, TCS told *Buss* that the price was "under $500."
Hardware Required: H/Z100 with two disk drives, 128K RAM.
Operating System: Z–DOS
Description: The TCS CP/M Emulator is a Z–DOS program which allows you to use CP/M programs while you are running Z–DOS.
Documentation: Manual, 40 pages. Glossary, index.
Performance: I tested the Emulator on three CP/M word processors: PIEZ, GALAHAD, and ZED–85. In each case, the Emulator displayed its banner on the console and then immediately returned me to the operating system. I called TCS and inquired about this problem. They suggested that the problem might be that the programs in question used some illegal programming "shortcuts." I was unable to verify whether the problems were caused by the programs, the Emulator, or human error on my part (perhaps the most probable explanation.) TCS told me that they have successfully tested a number of programs on the Emulator, including WordStar, dBASE II, the various TCS accounting programs, MBASIC, and the standard CP/M utilities such as PIP and DDT.
Ease of Use: The procedure for using the Emulator is straightforward, and requires no special technical expertise. It took me about an hour to go through the procedure the first time I tried it, and less on subsequent tries.

Z–DOS
$150; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Description: Z–DOS is the Zenith Disk Operating System, a version of Microsoft's MS–DOS.
Features:
—Z–DOS has several utility programs which CP/M–85 does not have:
–CREF, which builds a cross-reference for the assembler.
–DATE, which displays the date and allows you to change it if you wish.
–EXE2BIN, which converts executable files into binary code.
–FILCOM, which compares the data of

two disk files to see if they are identical.
–PAUSE, which temporarily suspends execution of a batch file.
–TIME, which displays the time and allows you to change it if you wish.

Documentation: Two volumes, approximately 680 pages. Index. Reference Guide.

Ease of Use: The *Sextant* staff has a few minor quibbles with Z–DOS.

I sometimes wish that Microsoft hadn't used a From:To syntax for the MS–DOS COPY command, particularly since the COPY commands in HDOS and CP/M use a To:From syntax.

When you use the PRINT command, it always displays two "banner" lines telling you "PRINT VERSION 1.02, Zenith Data Systems." This can occasionally be inconvenient. If, for example, you have just put a directory on the screen, and you would like to be able to see the top two lines, the PRINT banner will sometimes push them off the top of the screen. Technical Editor John Walker would like a switch which turns off the banner.

Other comments: Why, when you boot Z–DOS, does it always think it's 8:00 a.m., 8–27–82? It would be very nice if the default time and date was the last time and date entered in the previous session. Fortunately, Software Wizardry distributes Bill Parrott's solution to this problem. He's written a Z–DOS utility called Chronologic, which tells Z–DOS the time and date every time you boot it. For further information, see below, under the heading "Utilities".

Microsoft has issued version 2.0 of MS–DOS, so Z–DOS 2.0 should be appearing soon. Presumably Z–DOS 2.0 will be quite similar to the IBM Personal Computer DOS 2.00. Harry Miller, Associate Editor of *PC World*, wrote an excellent article for issue #3 of his magazine, called "2.00: The Path to Unix." It seems a safe bet that Z–DOS 2.0 will have many of the Unix-like features which caught Miller's attention in IBM DOS 2.00: hierarchical file structures, "pipes", and "filters".

MS–DOS 2.0 organizes files in a "tree" pattern: each group of related files is a "directory," and each directory can contain "subdirectories," which may be divided into still more subdirectories. There is no constraint on the number of subdirectories, except disk space. "Pipes" allow program output to be directed from one logical device (disk, console, printer, modem, etc.) to another. For example, one could send the directory output to a disk file rather than to the console. The "filters" include commands like SORT, FIND, and MORE, which take data from a logical device, modify it in some way, and send the data back to another logical device. The FIND command, for example, searches for a particular string of characters.

At the West Coast Computer Faire, Heath/Zenith's Barry Watzman, product line director, said that Zenith Data Systems will definitely do Z–DOS 2.0. He injected a cautionary note: Zenith's benchmark tests of MS–DOS 2.0 show that it is 60% slower than version 1.10. Nevertheless, he believes, "we will see Z–DOS 2.0 this year for certain, possibly by the late second or early third quarter."

We have received detailed information about these programs:

IBEm

$79.95; Wideman Computer Consulting

Hardware Requirements: H/Z100 with one disk drive, 128K RAM.

Operating System: Z-DOS

Description: IBEm is a program which enables the H/Z100 to emulate some of the screen features of the IBM Personal Computer. This allows you to run some IBM PC programs on the H/Z100.

Features:

(In Wideman's words:)

IBEm provides the following PC-like features:

—An 80 x 25 character screen.
—Direct cursor positioning.
—Read cursor position.
—Scroll screen or window up or down.
—Read character and attribute at cursor.
—Write character(s) at cursor using existing attributes.
—Write character(s) and attribute(s) at cursor.
—Write like a teletype.
—Respond with current screen mode (80 x 25).
—Respond with memory size.
—Respond with peripheral availability.
—Set cursor appearance.
—Accepts commands to set screen mode and active display page (although always operates as 80 x 25, page 0 only).
—Supports one type of character enhancement (attribute), which is reversal (black on white). A character sent with any kind of enhancement will appear reversed.

Features listed below were not implemented for one or more of the following reasons:

—Impossible to duplicate since it depends on features implemented inherently differently on Z100.
—Would use too much memory.
—Would slow down operation impractically.

IBEm does **not** provide the following PC features:

—Bit-mapped graphics.
—Text modes other than 80 x 25.
—Color text, although attempts to use color text will be translated to black and white.
—PC's light pen.
—Use of display pages other than page 0.
—Does not reassign the keys on the keyboard in any way, since that would be an arbitrary choice on our part. This may be done in a straightforward way using the ALTCHAR file, as described in your Z-DOS manuals.
—Does not fill in PC's graphics characters. This would remove from operation Z-DOS graphics characters. If PC's are needed, they can be obtained by use of ALTCHAR. (However, note the 9-line versus 8-line discussion in the "Notes on Implementation" section of the documentation.)
—And, of course, any direct calls to PC's ROMs or other software (except regular MS-DOS calls and the video calls IBEm emulates!), or direct manipulation of PC hardware, like the disk controller board, direct accesses to PC's memory-mapped screen, and so on.

(The following is paraphrased from Wideman's words.) Also included are several programs: CHR8, CHR9, LOCAL, and MLOCAL. CHR8 and CHR9 allow you to go back and forth between IBM's 8-pixel-wide characters and the Z100's 9-pixel-wide characters. With LOCAL, you can make the Z100 act like a terminal. This enables you to make full use of the Z100's escape code sequences.

Documentation: 17 pages. The "technical notes" provide quite a bit of interesting information about the H/Z100 and the IBM PC. Furthermore, the author has been unusually candid about the strategy behind the program design.

Z100 HDOS 2.0 Upgrade Program

$79.95; Newline Software

Hardware Required: H/Z100 with one disk drive and 128K RAM; an H8 or an H89 with at least one disk drive compatible with the HDOS distribution diskettes (generally H17 format, 5¼" hard-sectored); and a soft-sectored disk controller with at least one disk drive compatible with the H/Z100 disk drives, (usually 5¼" soft-sectored).

Operating System: Z–DOS is necessary to boot HDOS on the H/Z100.

Software Required: A set of standard Heath HDOS 2.0 distribution diskettes.

Description: You can use Z100 HDOS 2.0 to run many H/Z89 and H8 applications programs on your H/Z100.

Features:

—You can run most H/Z89 and H8 programs which were written for the 8080 central processor unit (CPU).
—There are, however, some programs which will **not** run under Z100 HDOS 2.0:
–Z80 programs for the H/Z89 will not work.
–Programs or device drivers that directly access the input/output (I/O) ports will not work without modification and reassembly because of the different port hardware of the H/Z100.

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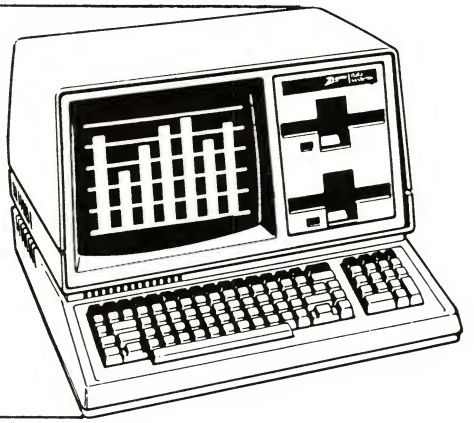

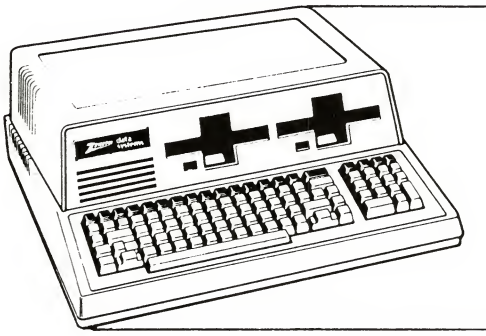

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—And there are some programs which will not work as efficiently on the H/Z100 as on the H/Z89:
  –Programs which use keyboard features of the H/Z89 that are not fully supported on the H/Z100. Such programs may run, but they will require using different keys on the H/Z100, which may make them inconvenient to use. For example, there is an ERASE key on the H/Z89, but not on the H/Z100. Text processors or editors that use all the function keys fall into this category.
  –Programs with lots of graphics may be slow on the H/Z100 because it must emulate the H/Z19 hardware.
—Generally, the same restrictions that apply to CP/M 2.x programs used under CP/M–85 on the H/Z100 apply to HDOS on the H/Z100 because of the hardware.
—Z100 HDOS 2.0 supports device drivers, though the standard HDOS device drivers must be modified slightly. Newline is working on a program to make the changes automatically, but for now instructions will be included for modifying the source code provided on the standard HDOS distribution disks.
—Newline is offering printer device drivers modified especially for Z100 HDOS. For example: Newline's HDOS UD.DVD Universal Printer Device Driver; the MX.DVD MX–80 Device Driver,; the H25.DVD Device Driver. All of these drivers are available with built-in spoolers. Newline's TxtPro text processor will also be available under Z100 HDOS 2.0.

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We have received general information about these programs:

CP/M–86
Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Description: CP/M–86 is the version of Digital Research's disk operating system designed to run on the 8086 CPU. The 8086 is a close relative of the 8088 CPU which is the 16-bit side of the H/Z100's dual processor.

Editors, etc.

In this section, we're including text editors, text processors, word processors, and spelling-checkers (as well as a writing-analysis program called SUPERFOG). A *text editor* is a program designed to make it easy to enter and revise text, which is generally stored on a disk file. A *text processor*, on the other hand, is a program intended to take text (from memory or a disk file) and print it out in a desired format. *Word processors* are programs which perform both editing and text processing functions within the same software package.

You may assume that all the text editors and word processors listed here share the following standard features.

Strikeover and *insert* modes. When you are in strikeover mode, as you type into the middle of an existing document the new characters *replace* the characters at the cursor. When you are in insert mode, the new words or characters *displace* those under the cursor, moving the rest of the line the appropriate distance to the right.

Word wrap or *wrap-around* mode. You set a right-hand boundary for your text. When the cursor reaches that column, the word you are currently typing is moved intact to the next line. Using word wrap, you can type merrily away without having to worry about hitting the carriage return key at the end of every line.

Search and *replace*. You can tell the program to look for a particular string, or sequence of characters. It will find the next occurrence of that string and indicate that location somehow. If you like, it will replace that string with another. From any point in a document, you can find the next place where you used a string ("Zenith", for example) and change that string to something else (e.g., "Heath/Zenith").

Global search and replace. This feature allows you to repeat a search and replace procedure throughout a document. You can tell the computer to go through the entire document, find all occurrences of a string, and replace every occurrence with another string—all with one command.

Join. This feature enables you to join two adjacent lines into one new line.

Break. Using this feature, you can split a single line into two separate lines.

Cursor control features. There are various ways in which you can move the cursor around the screen. All the H/Z100 programs we reviewed can use the H/Z100's regular cursor control arrow keys, which move the cursor one space up, down, left, or right. Unfortunately, the arrow keys on the H/Z100 are arranged in a pattern which some people find rather uncomfortable. However, some programs can enable the keypad to emulate the diamond-shaped pattern used on the H/Z89 and H/Z19. Usually a program assigns several special keys (such as the function keys, HOME, or the shifted arrow keys) which you can use to move the cursor to the top or bottom of the file, to the end or the beginning of the current line, and so forth.

Cut and paste. You can remove a chunk of text (a paragraph, say) from the document, store it in memory, and then put it in another place in the document. This is very helpful when you are editing and revising.

The features described below are not standard, but they are quite common.

Most of the editors we tested allow you to see a *directory* of your disk files, without requiring an inconvenient exit to the operating system.

Many editors have a *command* mode, in which you can type brief alphanumeric instructions to the editor. Command mode is generally used to perform global searches and replacements, to manipulate disk files, and for other editing functions not directly related to entering and revising text.

A few editors can store a sequence of editing commands on a disk file, and can then automatically execute that *macro* whenever the user desires. This can be very useful when you need to perform the same operations over and over again on a number of different files. For example, *Sextant* uses macros to prepare articles for the typesetter. The typesetting codes must be inserted at paragraph endings, subheads, font changes, and whatnot—a tedious and error-prone process if done by hand. With a macro capability, the editor does all the work.

Some editors can edit files longer than memory. There are several different ways of doing that. Editors which use the *longfile* method read the first part of the file into memory, and leave the rest on disk. (I use "longfile" because that's the word Steve Robbins uses in EDIT19, the editor with which I am most familiar.) When you want to edit the next part of the file, you must write the first part out of memory and onto

disk. Then you must proceed all the way through the file before you can edit that first part again. Obviously, this method might prove inconvenient in some cases, so it's fortunate that there is another approach. Editors which use a *transparent* method of handling files larger than memory generally do so by "swapping" the appropriate parts of the file from disk to memory and back again in response to your travel through the file. You can perform all the normal editing operations throughout the file without necessarily seeing any evidence of the swapping procedure (nence "transparent").

Text processors and word processors have various *text formatting* features. *Paragraph formatting* enables you to reshape a paragraph to fit a new right-hand margin. *Right justification* inserts spaces into each line so that the lines all end flush with the right margin. [This makes the document look pretentious. —Ed.] *Pagination* features allow you to determine the number of lines per printed page, the upper and lower margins, and similar matters. *Printer control capabilities* let you use your printer to boldface, underline, overstrike, and so forth.

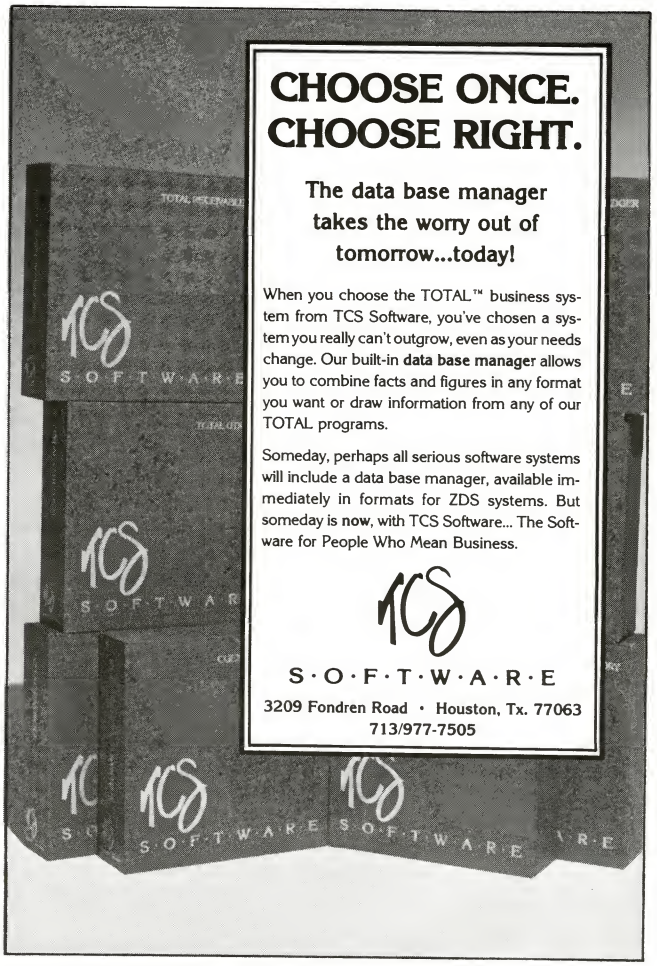
Spelling-Checkers

A spelling-checker program checks each word in a text file against the program's dictionary, and flags any words it cannot find. You can indicate any misspelled words. After you finish with the spelling-checker, you can use an editing program to return to the text file and correct the words. (Some spelling-checkers can correct errors from within the program.) On the other hand, the spelling-checker may flag some words which are not in its dictionary, but are nevertheless correctly spelled in your text file. In that case, you can add the correct spelling of the flagged word to your dictionary. Two central features of any spelling-checker are the size of its dictionary and the ease with which the dictionary may be expanded.

We have tried out these programs:

Document Editor
$125.00; Next Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Document Editor is a text editor.
Features:
—Document Editor is written in Z–BASIC.
—The "DUP" special function key duplicates the contents of the line immediately above the cursor.
Documentation: 148 pages. Index.
Performance: Considering that it is written in Z–BASIC, this is a surprisingly fast program. The cursor disappears when you engage the auto-repeat function on the arrow keys, but the other editing functions seem to be performed without any noticeable lag. Document Editor performs most of the standard text editing functions, but there is no insert mode. Changes are inserted by two methods: you can use the Insert Character key to move the line to the right, one space at a time; or you can go to the command line and use the "Insert Phrase" command, which allows you to insert up to 50 characters. (To make room for the insertions, the words at the end of the line wrap around to the next.) Hence this program might not be very well suited to users whose work involves extensive revision of existing text files. As its name might suggest, the Document Editor seems to be best at handling "boiler-plate" documents, such as standardized letters.
Ease of Use: Document Editor uses the special function keys well, and the typical office worker should be able to master the program with little difficulty.
Other comments: The fact that this editor is written in Z–BASIC should make it much easier for users to customize the program to suit their needs.

EDIT
Steven Robbins
EDIT is the developmental version of Steve Robbins' forthcoming full-screen editor, issued with a limited license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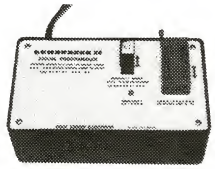
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scheduled to expire July 31, 1983.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: EDIT is a full-screen editor for the H/Z100.
Features:
—You are able to choose the foreground colors for the display, the help screens, the command line, and the status line.
—You are able to define F0 as a special function key.
—EDIT commands are compatible with EDIT19, Steve Robbins' editor for the H8 and H/Z89.
Documentation: There is a .DOC file on the EDIT disk with approximately 15 pages of information.
Performance: EDIT is unable to handle files larger than memory. Since there is 57K of available memory, this is not usually a significant problem. The program is very fast in moving the cursor and performing global changes—even when tested with a file 220 sectors long, or 55K.
Ease of Use: EDIT makes full use of the special function keys, and provides concise HELP screens. It was an easy editor to learn, particularly since it uses the same commands as EDIT19, the editor we use on our H8.
Other comments: Robbins says that the full-scale editor will implement many advanced features, such as editing files larger than memory; executing "macros"—multiple editing commands stored in a disk file—and greater keyboard reconfigurability. By the time you read this, Steve Robbins should be selling the full-scale editor.

ESE
Extended Screen Editor
$100; Cherry Engineering
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: ESE is a screen editor designed to give the programmer an efficient means to enter source code for a compiler.
Features:
—You can simultaneously view multiple files. ESE can hold up to three screens in memory. You may simultaneously view these "virtual" screens on your physical screen.
—Files may be larger than memory.
—You can assign almost any of the 93 keys on the H/Z100 keyboard to perform any of ESE's 105 editing functions.
—You can also reconfigure the standard keyboard functions as you wish. For example, you could switch the functions of the RETURN and LINE FEED keys.
—You may modify the E.HLP file (which normally appears when you hit the HELP key) to reflect those keyboard assignments.
—A multiple-screen HELP file is available in versions after 2.0.
—You can choose a different foreground color for each of the three virtual screens.
—Cherry Engineering also supplies a text processor, CTEXT, on the ESE distribution disk. They do not provide support for CTEXT. It is, however, free.
Documentation: User's manual. 46 pages.
Performance: ESE is the most powerful of the text editors we tested. The ability to view multiple files through "virtual" screens might be very helpful for some applications, such as comparing chunks of source code in two different program files. ESE's power doesn't come from that single feature, though; it derives mainly from the fact that you can assign any of the 105 editing functions to almost any key on the H/Z100. This enables you to design an editor tailored to meet your specific needs.

One minor problem came up when I evaluated ESE version 1.89: when I hit my stride, I could type faster than version 1.89 could put letters on the screen.

I tested CTEXT on an H/Z100 with a Spinwriter 7715, and it printed out the CTEXT user's manual, complete with page numbers, bold-facing, underlining, index, table of contents, and various other printing control capabilities.
Ease of Use: ESE isn't particularly easy to use, simply because of the number of functions it can perform, and also because the documentation is rather condensed. However, since you can configure ESE to suit your particular needs, it could be more convenient in the long run for a technically confident user.
Other Comments: Just before this issue went to the typesetters, we received a prerelease copy of ESE 2.1. Cherry Engineering says version 2.1 is much faster than the version 1.89 which I tested, and my brief test supported that claim. I was a trifle disappointed, however, to discover that version 2.1 no longer allows the user to set the background color of the screen—Cherry says that fixing the background color as black makes ESE run faster.

GALAHAD
Golden Knights Software
Clarkson College says that they intend to make GALAHAD available for sale this fall, first in a CP/M–85 version and later in a Z–DOS version.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85
Description: GALAHAD is a combination editor and text processor.
Features:
—GALAHAD comes with a program called GALRST, which allows you to restart GALAHAD *with the current text intact* if you exit to CP/M, either accidentally or deliberately.
Documentation: Documentation manual, 13 pages. Beginner's manual, 34 pages.
Performance: GALAHAD performs all the essential functions of an editor and text processor. This version of GALAHAD doesn't appear to have many "bells and whistles," though. The print control commands are one of GALAHAD's strongest features. Perhaps it was designed to meet academic format requirements, which sometimes seem more complex than the typical format rules of the business world.
Ease of Use: To judge by the documentation, GALAHAD was intended for novices, and should not be unusually difficult to learn. It would help, however, if GALAHAD displayed more reference information on the screen.
Other comments: Clarkson College is issuing Z100s to all faculty members, to many administrative staffers and current students, and to all entering freshmen. GALAHAD is the word processor designed for use at Clarkson.

PIE 1.5(d)
$29.95; The Software Toolworks
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85.
Description: PIE is a text editor.
Features:
—String search forward and backward.
—Macro facility for search/replace and other functions.
—You can instruct PIE to automatically make a backup copy of the file currently being edited.
Documentation: Manual, 19 pages. October 1982 documentation update, 2 pages.

I have a few quibbles with some of The Software Toolworks' phraseology. For example, why do they start off by defining PIE as a "two-dimensional cursor-based screen editor"? Such quibbles to the contrary notwithstanding, the documentation for PIE is for the most part clear and well-written.
Performance: The Software Toolworks says "PIE is a text editor, and not a word processor. It is not intended to prepare text in a neat format for output to a printer." As long as you bear that statement in mind, you should be satisfied with PIE's performance as a basic text editor. PIE is intended to be used with The Software Toolworks' text processor, TEXT.
Ease of Use: "Easy as ..."
Other comments: There is a review of the HDOS versions of PIE and TEXT in issue #1 of *Sextant*: "A Professional Writer Looks at Budget Word Processing," by Hugh Kenner.

SPELGUD and **SUPERFOG**
$45.95; Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85 or Z–DOS

Description: SPELGUD is a spelling-checker.
Features:
—SPELGUD can send a list of non-dictionary words to the screen, to a printer, or to a disk file.
—A program called DICTPREP (dictionary preparer) is included with SPELGUD. It is used to "compile" fast-reading dictionaries from text files. You may use DICTPREP to add lists of new words to your main dictionary file.
Documentation: Seven pages.
Performance: SPELGUD loads its dictionary in about one and a half minutes. SPELGUD processed a 20-sector file in approximately 50 seconds.
Ease of Use: All you really need to know is how to type "SPELGUD."
Other comments: On page one of the documentation, I read: "this document was completely processed by SPELGUD in 6 minutes." So I was amused to see a typo on the very next page of the documentation, where it says: "Make sure you have pruchased the correct version." Actually, this points up one of the weaknesses of spelling-checker programs which are not integrated with an editor. After the spelling-checker tells you about the non-dictionary word, you still have to *remember* to go back and change it in the original document.

Description: SUPERFOG checks the "fog index" of the sentences in a text file. Sentences which use big words score high on the fog index. So do sentences which use too many words.
Features: At the end of its run, SUPERFOG presents you with several pieces of information.
—The average length in words of each sentence in the file.
—The average length in characters of each word in the file.
—The number of sentences in the file.
—The number of characters in the file.
—The number of words in the file.
The fog index is computed by a formula:
—Fog index = 0.4 × (words per sentence + 20 × (average characters per word - 4.0)).
The fog index represents the number of grades of education someone would need in order to easily read your text.
Documentation: Three pages. The fog index of the documentation is approximately 8.
Performance: When you run SUPERFOG, the first prompt you receive will ask you to enter a maximum fog index. Then you tell it which text file to read. It will then display each sentence, followed by a line of fog index information, and stop each time a sentence has a fog index higher than your specified maximum. It will tell you why the fog index is high, and then proceed on through the file.

SUPERFOG reads text at a rate of about 1,000 words per minute.
Ease of Use: Put the disk in, type "SUPERFOG", and away you go.
Other comments: The idea of a fog index is based on the work of Robert Gunning, a writing consultant. He didn't apply it to individual sentences, though, and he counted syllables per word, not characters. (It's harder to make a computer count syllables than it is to make a computer count characters.)

This program is a useful tool, but it is only that—you should be the final judge of your own style and readability. SUPERFOG's biggest advantage is that it warns you when a particular sentence has an unusually high fog index. That way, you know when it might be wise to take another look.

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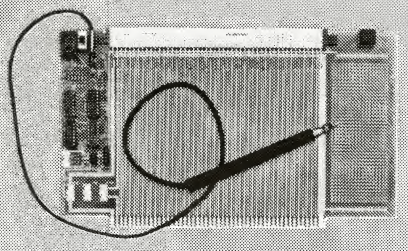

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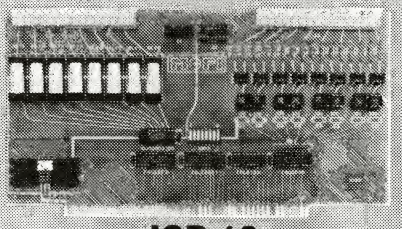

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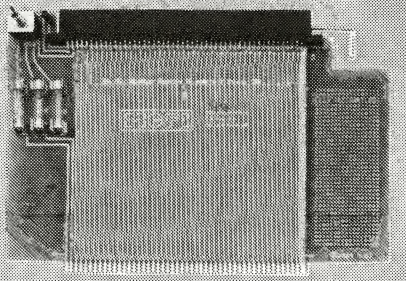

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TxtPro 4.1
$59.95; Newline Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS or CP/M–85.
Description: TxtPro is a text editor.
Features:
—Control characters displayed in reverse video.
—When you type the Z–DOS command line which invokes TxtPro, you may select the background and foreground colors of the screen display.
—Completely menu-driven. *All* commands are entered by choosing from a list of special function keys, which is displayed on the 25th line of the screen.
—OOPS function allows you to undo the effect of the last command entered. If, for example, you accidentally delete a line you wanted to preserve, you can hit the OOPS key (F0), and your line will be restored.
—Paragraph formatting.
Documentation: Manual, 20 pages.
Performance: TxtPro does have a couple of shortcomings. For one, the search-and-replace function is not global. To make changes throughout a document, you have to repeat the same command over and over again. Another problem is that you can't do a file directory from within TxtPro. On the whole, though, TxtPro performs the basic editing functions quite capably.
Ease of Use: TxtPro's most important distinguishing characteristic is that it is entirely menu-driven. On the one hand, this makes it much easier for novices to learn. There are no commands to remember, no syntactical conventions to keep straight, no parameters to select. All the options are prominently displayed on the 25th line of the screen. On the other hand, though, there's generally only one way to do a particular task, and if you don't like the menu selection, there isn't much you can do about it. For these reasons, TxtPro is probably better suited for simple office editing work than for large, complex projects.

VEDIT
Disk and manual $195; manual only: $18; CompuView Products, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS or CP/M–86
Description: VEDIT is a text editor intended for programmers.
Features:
—"Undo" key allows you to undo editing mistakes and restore a line to its state before the last command.
—You can use up to 10 "scratchpads" for cutting and pasting text.
—Multiple macros allow you to execute "programs" of editing commands stored in various disk files.
—You can program the keyboard special function keys.
—If you run out of disk space, VEDIT lets you delete files or change disks to make room, so that you don't lose text.
—Repeat function key allows you to repeat a command *n* times.
—Can edit files larger than memory, using "longfile" method.
—Automatic indentation.
—Conditional lower to upper case conversion, for use in converting assembly language opcodes, labels, and operands to all upper case while preserving comments in lower case. (VEDIT searches for the character ";", or whichever character you are using to separate comments from code.)
—You can customize your keyboard layout by assigning each editing function to a particular special function key, control character, or escape sequence.
—You can also reconfigure many of VEDIT's default parameters. (For example, you can select the type of cursor you would like—blinking or non-blinking, underline or block.)
Documentation: User's manual, 152 pages. The tone is unapologetically technical. If you know what you're looking for, though, the information is all there, well organized, and presented in as much detail as you could want.

One interesting point: CompuView wrote the documentation in what you might call "pseudo-code." VEDIT is intended to be used on a wide variety of terminals and computers, so all the documentation is written in terms of the generic editing functions—for example, SAVE TEXT—instead of the keyboard commands which perform that function on a particular computer. CompuView provides VEDIT purchasers with a list of all the function/keyboard correspondences for their particular terminals. That way, the users can translate editing functions into keyboard commands by a simple one-step process, and CompuView saves the cost of writing documentation for each different brand of computer.
Performance: VEDIT is similar to Cherry Engineering's ESE: it is a flexible, easily customized editor intended for programmers. The two programs appear to be roughly in the same performance class. ESE is somewhat more optimized for the H/Z100 than VEDIT, since ESE can set the foreground color of the display.
Ease of Use: VEDIT's "visual" mode, where you will spend most of your time, has a multiplicity of valuable one- or two-keystroke commands which make it very easy to enter and modify text. The "ready-to-run" version of VEDIT which we received uses the special function keys *and* the numeric keypad *and* the CTRL key *and* the ESCape key. In fact, there are so many different commands that a novice might find VEDIT rather confusing. (Particularly since VEDIT's initial keyboard layout uses the H/Z100's HELP key to exit from visual mode to command mode, where the user is prompted only by an unfriendly asterisk). On the other hand, though, experienced computer users would be able to use VEDIT's customization ability to set up their own keyboard layouts.

You will probably use VEDIT's command mode to do global searches, to perform repetitive editing changes using command macros, and to execute file-handling operations. The commands are logically structured, but difficult to remember. For example, to print out a file, you type this: B#EO ESCape ESCape. The "B" tells VEDIT to move to the beginning of the text buffer, the # tells it that the next command will concern up to the maximum of 32,767 lines; the EO tells it to send those lines to the printer, and ESCape ESCape terminates the command line. Despite the logical structure underlying such a command, the typical office worker is going to find that syntax somewhat intimidating. Of course, VEDIT isn't intended for the typical office worker. It's intended for professional programmers, who are used to dealing with complex syntactical structures, and who are willing to sacrifice "user-friendliness" in exchange for more complete control over the editor's operations.
Other comments: VEDIT is available for an unusually wide variety of terminals and computers.

VIPROC
$75.00 for VIPROC (VISED and TPROC); $50 for VISED alone; The Software Subscription
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS or CP/M–85.
Description: The VIPROC package consists of two programs. VISED is a text editor, and TPROC is a text processor.
Features:
—You can use macros to repeat editing sequences a specified number of times.
—Represents control characters in reverse video.
—Accepts most Unix version VI commands.
—CTRL–G displays a "graticule," which is a numbered line on the screen showing character and tab positions.
Documentation: 38 pages. Command summary.
Ease of Use: VISED appears to have an unusual command structure. In order to insert characters, you must engage the insert mode by typing "I". Then you go ahead and type in your text. However, if you want to go back and change a word, say, you have to leave insert mode, which you accomplish by hitting ESCape. (You can't move the cursor around in the text while you're in insert mode.)

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Then, when you're where you want to be in the file, you must type a command in the form *n*r, where n is the number of characters you would like to replace. This seems unnecessarily cumbersome: in most editors you don't have to do all this switching around between modes.

WordPerfect
$495; Satellite Software International
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: WordPerfect is a word processor.
Features:
—Text formatting functions such as page centering, page numbering, etc.
—Special printing abilities such as superscripts, subscripts, overstrikings, etc.
—Macro capability. Macros may "chain" to other macros.
—Mailing list function can merge letters and address lists.
—Math mode allows you to do basic numeric calculations within WordPerfect.
—Includes WordPerfect Speller, with a 30,000 word dictionary.
Documentation: Approximately 185 pages. The documentation was written specifically for the IBM PC (as you can tell from the picture of the IBM keyboard on page i-1.) Hence, it frequently tells you to perform a command by using an IBM key such as ALT—but there is no ALT key on the H/Z100, of course.

However, Satellite Software provides a 3-page flyer telling the H/Z100 user how to interpret the PC-oriented documentation in terms of the H/Z100 keyboard. There is a listing of the WordPerfect functions and the corresponding special function and numeric keypad keys on the H/Z100. SSI also sends along an overlay which you can set on top of your keyboard to remind you what does what.

The documentation is professionally packaged, well organized, and clearly written. The fact that it's written in terms of the IBM PC is going to be an inconvenience for H/Z100 users, though. It might have been better if SSI had taken the "pseudo-code" approach used by CompuView's VEDIT (see above).
Performance: WordPerfect appears to be a powerful word processor, with considerable text formatting and print formatting capabilities. It would probably be most valuable for users whose greatest need is for highest-quality printed output.
Ease of Use: Learning WordPerfect will be a bit of an adventure, because of the PC-oriented documentation. On the other hand, the HELP key has an unusual special feature. Hit HELP, and the H/Z100 will ask you "HELP with what?" You then type a particular special function key, keypad character, escape sequence, or control character, and you'll see some information about the corresponding WordPerfect function. All the special function keys and numeric keypad keys have different shifted and non-shifted functions, so there is a lot of information to absorb. Version 2.24 of WordPerfect features a further improvement to the HELP screens: you can now choose to see a listing of all WordPerfect functions and the corresponding keys on the H/Z100.
Other comments: WordPerfect has announced the availability of Personal WordPerfect, a scaled-down version of WordPerfect, selling for a scaled-down $195.

ZED-85
$35; Zeducomp
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M-85.
Description: ZED–85 is a full-screen text editor.
Features:
—Forward and backward search and replace.
—H/Z19 and H/Z89 "diamond" keypad emulation mode.
—Selected blocks shown in reverse video.
—Entirely menu-driven.
Documentation: User manual, 25 pages, with tutorial and index.
Performance: ZED–85 performs the basic editing functions capably. It's quite similar to TxtPro—it even has some of the same weaknesses, such as an inability to do truly global search-and-replaces. ZED–85 can only search for the next or last occurrence of a string. Nor can it do a directory from within the editor.
Ease of Use: ZED–85, again like TxtPro, is completely menu-driven. I've discussed the advantages and disadvantages of this philosophy in the section on TxtPro.
Other comments: *Un*like TxtPro, ZED–85 has no color control.

We have received detailed information about these programs:

WSKEY
$29.95; Skill Data
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85
Software Required: WordStar
Description: WSKEY is a WordStar enhancement which enables you to use the H/Z100 special function keys to give WordStar commands.
Features:
—You install the enhancement automatically using a SUBMIT file, which modifies the WordStar disk, so that you only have to install WSKEY once.
—The function key commands follow the conventions established by PIE and PeachText (Magic Wand).
—All function key commands are labelled by a banner on the twenty-fifth line; you may toggle this banner on and off.
Documentation: Four pages.

100/Star
$29; Interaction Dynamics Systems, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85
Software Required: WordStar 2.x or higher.
Description: 100/Star enables you to use the H/Z100 special function keys to give WordStar commands.
Documentation: Four pages. Summary of WordStar key functions on the H/Z100.
Other comments: Interaction Dynamics Systems also sent us a CP/M–85 program called EP/Star, which is designed to enable WordStar to use the full capabilities of the Epson MX–80 dot matrix printer. For example, EP/Star uses the WordStar print menu to give you single-key control of wide, narrow, or normal print width; bold or normal strike; and normal or italics characters (if the graphics chips have been installed.) EP/Star has four pages of documentation and costs $19.

We have received general information about these programs:

MailMerge
$139; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: WordStar.
Description: MailMerge enables you to combine a file containing names and addresses with a file containing the text of a standard letter.
Features:
—Chained printing allows you to "nest" a file call within a main body of text, so that the specified file will be printed when the main file is printed.
—With one command, you can print multiple copies of the same file.
Other comments: A MicroPro product.

PeachText 5000
$395; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Peachtext 5000 is a package of several programs: PeachText (also known as Magic Wand); PeachCalc (also known as SuperCalc); List Manager; a Spelling Proofreader; and the Random House Electronic Thesaurus. Information about PeachText and the Spelling Proofreader is presented in this section. For more information about PeachCalc, see Ken Patrick's article on

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-Specify EPSON MX-80/100,NEC-8023,C.Itoh 8510, Paper Tiger,MPI 99, or Microline 82a/83a/84. Source code included for all drivers.
+$20.00 postpaid. State CPM or HDOS. Write for custom drivers.

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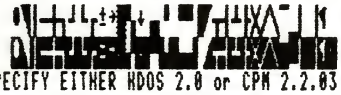
H/Z GRAPHICS on EPSON MX or FX, NEC-8023, C. Itoh 8510, MPI 99,  Microline w/OKIGRAPH.
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+Requires 2k buffer or parallel interface. Also requires bit graphics capability. $25.00 postpaid.

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* Edit transactions on the screen; insert/delete transactions
* Req. Microsoft BASIC, 48k or more RAM. $20.00 postpaid.
CP/M to DRI; Z-DOS, Z-100 and Z-89 to Zenith; HDOS to Heath

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spreadsheets in the Winter 1983 issue of *Sextant*.
Description: PeachText (also known as Magic Wand) is a word processor.
Features:
—Print formatting, hyphenation, and pagination commands can be imbedded in the text of your document.
—You can define up to 128 variables of up to 55 characters each—which you can use for repetitive jobs such as "boilerplate" documents.

Description: Spelling Proofreader is a spelling-checker.
Features:
—Spelling Proofreader can check a 10,000-word document in less than two minutes "on a typical system."
—Menu-driven.
—You can increase your dictionary size up to the limit of your disk storage capacity.
—20,000 word standard usage dictionary, plus provision for additional specialized dictionaries (engineering, legal, medical, etc.)
Other comments: PeachText 5000 comes with a box of 10 blank Peachtree/Wabash 5¼" diskettes.

Spellbinder
$275; Lexisoft, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85 or Z–DOS
Description: Spellbinder is a word processor and "Office Management Package."
Features:
—Macro capability.
—Can edit files larger than memory, using "longfile" method.
—Can run any CP/M COM file (20K or less) from within Spellbinder.
—Extensive print control commands.

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Other comments: For a review of Spellbinder, see Walter Jung's article elsewhere in this issue.

SpellStar
Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: may be used as an option with WordStar.
Description: SpellStar is a spelling-checker.
Features:
—20,000 word dictionary.
—Counts the number of words in your text file.
—You can correct the errors in your document *without* leaving SpellStar.
—You can simultaneously use WordStar's edit mode.
—Provision has been made for adding special dictionaries for law, medicine, and other professions.
Other comments: A MicroPro product.

WordStar
$399; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: WordStar is a word processing system.
Features:
—HELP messages normally displayed on screen.
—Dynamic page-break display shows you where pages end and begin. If you insert new text into a page, all the following page breaks are automatically recalculated.
—Print enhancements such as boldface, double strike, underline, strikeout, subscripts, superscripts, variable character pitch, variable line height, alternate type style and ribbon color are all possible using a daisy-wheel printer.
—"Flexible right-justification."
—Flexible pagination.
—Hyphenation assistance.
—Decimal tabbing, for arranging columns of numbers.
—"Paragraph indent."
—Print spooling.
—Program execution. You can run a program while you are still within WordStar.
—Column move allows you to move blocks of text horizontally.
—Horizontal scroll allows you to display lines wider than 80 characters.
—With a color monitor, "help" is set in yellow, screen display is in green, and spelling errors are in red.

Accounting

Accounting software is used to record, report, and analyze the financial activities of an organization.

General Ledger programs are concerned with the company's overall balance between income and expenses.

Accounts Receivable programs keep track of who owes you money, how much, and from how long ago.

Accounts Payable programs tell you to whom you owe money.

Inventory programs tell you how many widgets you have in stock, how many you've used, and when you'll need to replace them.

You may note that in this section, we have not generally summarized information about *Features*. We felt that if you're shopping for accounting software, you'll probably want to fit that software to a particular situation with its own unique set of requirements. Hence, we suggest that interested readers contact the supplier for full information.

We have received general information about these programs:

Multi-Location Perpetual Inventory System
$99.95; Husker Systems of Nebraska, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: This is an inventory-management system.
Features:
—"multiple locations," which means you can keep track of widgets stored in more than one place.
—cost and sales figures.
—reports for physical inventory taking.

Peachtree Accounts Payable
$399; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS

Peachtree Accounts Receivable
$399; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS

Peachtree General Ledger
$399; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS

Peachtree Sales Invoicing
$399; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS

Software Fitness Program
around $500-$700; Open Systems, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS or CP/M–85
Software Required: Open Systems' version of BASIC.
Description: The Software Fitness Pro-

gram is general business accounting software.

TCS Total Accounting System
TCS Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85 or Z–DOS
Description: The TCS Total Accounting System includes Total Ledger, Total Receivables, Total Payables, Total Payroll, Total Inventory, Total Utilities, Total Materials, Total Sales, Q/Label, Simple, and the Total Client Ledger System.

Spreadsheets

A spreadsheet program lets you perform rapid calculations on numeric data arranged in a table or matrix. The term "spreadsheet" derives from the familiar column-ruled paper spreadsheets used in accounting. If you've ever drawn up a budget, you know what a spreadsheet looks like. And if you've ever had to recalculate an entire table of numbers as the result of changing one crucial assumption, you'll appreciate the great virtue of electronic spreadsheets. Spreadsheet programs can recalculate such tables almost instantly.

Spreadsheets are divided into vertical *columns* and horizontal *rows* composed of individual items of numeric or alphanumeric data, or *cells*. You can perform operations on the cells by using *formulas*. For example, you could use a formula to instruct the computer to add up all the cells in a particular column of the *worksheet*. ("Worksheet" is another word for your table or matrix of data.)

(In the Winter 1983 issue of *Sextant*, Ken Patrick did a comprehensive review of eight spreadsheet programs [not all of which are available for the H/Z100]. His article, "Eight Spreadsheets Compared: Charting Products to Eliminate Tedious Calculations," includes more detailed remarks on Multiplan and PeachCalc/SuperCalc.)

We have tried out these programs:

Multiplan
$250; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Multiplan is an electronic spreadsheet program.
Features:
—Worksheets may contain up to 63 columns by 255 rows of data.
—You can SORT data within a column.
—You can make one or several spreadsheets dependent on a master spreadsheet. That is, the spreadsheets can be linked so that cells in one sheet are derived from entries in another.
Documentation: Two volumes. Approximately 380 pages. Index. Command Directory.
Performance: Multiplan's linking ability allows you to transcend the nominal limits on numbers of columns and rows. For example, with most spreadsheets you can't do a worksheet with a year's worth of daily entries, because that would be 365 rows, but with Multiplan you can handle those entries with what is effectively one worksheet.

One of Multiplan's most interesting aspects is its capability to anticipate your next keystrokes, based on a combination of observation of your previous behavior and on Microsoft's expectations of the "logical" way for you to use the program's features.
Ease of Use: With no previous experience using a spreadsheet, I was able to create a modest Multiplan worksheet within forty-five minutes.
Other comments: Multiplan is a Microsoft product.

We have received detailed information about these programs:

Taxez 1982
$26.00; Links Comm
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Multiplan
Description: Taxez 1982 is a series of worksheets designed to help you prepare federal income taxes using the Multiplan spreadsheet program.

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–Several work sheets include IRA, Earned Income, and All-Savers plus a Form 1040A.
Documentation: 10 pages.
Other comments: Taxez 1983 is scheduled to be available by January 1st, 1984.

We have received general information about these programs:

Construction Calc
Robert Curtis, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M or Z–DOS
Software Required: SuperCalc
Description: Construction Calc is a set of SuperCalc templates that carries out cost estimating work for construction projects.
Other comments: "It should be noted that SuperCalc files from version 1.05 can be read by 1.12, but not conversely, as a result of the different method used in data compression in the latter."

1–2–3
$495; Zenith Data Systems
Hardware Required: H/Z100 with two disk drives, 192K RAM.
Operating System: Z–DOS
Description: 1–2–3 is an integrated software package which includes a spreadsheet, a data base, and graphics capabilities, all contained within one program.
Features:
—1–2–3 can read and manipulate 1–2–3 files stored on compatible disk formats, such as the IBM PC.
—Hands-on tutorial disk is included in the package.
Other comments: 1–2–3 is a product of Lotus Development Corporation.

PeachText 5000
$395; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: PeachText 5000 is a package containing several programs: PeachText (formerly Magic Wand); Spelling Proofreader; the Random House Thesaurus; List Manager; and PeachCalc, a spreadsheet program derived from SuperCalc.
Description: SuperCalc/PeachCalc is an electronic spreadsheet.
Features:
—You can use up to 127 characters for report headings and supporting footnotes.
—You can use the "protect" command to prevent changes from affecting individual cells.
—You can review formulas at a keystroke.
—You can use AND, IF, OR, and NOT statements to make conditional calculations.
—63 columns by 254 rows of data.
—HELP function.

Data base management systems

A data base management system (DBMS) gives you a flexible way to store, categorize, and retrieve information. That information is organized into *records* composed of various *fields*, or different types of data. A data base containing membership information about a local Heath Users' Group would probably have one record per member, divided into fields which contain information about the member's name, address, phone number, computer system, annual dues paid, membership category, and special skills.

You will, from time to time, wish to *enter* new records. You might wish to *update* a particular record to reflect new information—a change of address, say. Or you might wish to *inspect* a record.

You could do all those things with paper and a filing cabinet, of course. The standard paper filing system is what we might call a *hierarchical* data base. To get at a piece of information, you have to follow the "chain of command." Let's say you know that someone's current address is 1208 Bydding Road, and you know that it should be changed to 1925 Lorraine Place. If you are using a hierarchical filing system and you want to change that address, you must know that the first address is stored under the record for "Frederick Zimmerman."

If you have a *relational* data base, though, you don't need to know anything except the two addresses, because relational data bases treat each field as a discrete unit of data. With a relational DBMS, you can simply tell the computer to *select* all the address fields which say "1208 Bydding Road," and it will show you all the records which satisfy that criterion.

Or maybe you'd like to send a letter to all HUG members in a certain ZIP code area: let's say Ann Arbor, Michigan. You can tell the computer to look for all the records where the ZIP code value is greater than or equal to 48101 and less than 48109, and that way you can assemble a *mailing list*. It will probably go through the records from start to finish and give you a list like this: record 101, ZIP code 48109; record 105, ZIP code 48104; record 109, ZIP code 48105; record 123, ZIP code 48103. You can also establish other relationships between data fields—for example, you could take the list of records with an Ann Arbor ZIP and select all the people who have H/Z100 computer systems. Or perhaps you're an orderly person, and you'd like to send the letters to the post office organized in ascending ZIP code order. No problem: just *sort* the list.

If you have a top-of-the-line DBMS, you can accomplish much more complicated tasks by writing programs in the program's own specialized *applications language*. These "mini-languages" use a vocabulary of commands and parameters similar to general-purpose high-level languages such as BASIC, but are dedicated specifically to data base applications.

We have tried out these programs:

Condor File Management System
$299; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Condor is a data base management system.
Features:
—DEFINE command allows you to create new data bases quickly by creating files defining all the new fields, the new format for input entry, and so forth. You can also use the DEFINE command to redefine data files in an existing database.
—STAX command allows you to perform some types of statistical operations on your data files. For example, each record in our HUG data base has an entry for number of members, so we could use STAX to count the number of records, the total membership from all records, the average membership, and the minimum and maximum memberships.
—Can manage up to 32,767 records; up to 1,023 characters each, in up to 127 fields.
Documentation: Approximately 256 pages. Index. Glossary. Reference guide. Tutorial.
Performance: I don't know enough about the relative speed of other data base programs to judge the significance of this fact, so I'll simply mention that I was surprised when Condor took several seconds to SORT a test data base containing only 6 records.
Ease of Use: With no prior experience using a data base, I was able to get a primitive system operational within two hours after running the system for the first time. The documentation includes a 109-page tutorial which takes you through the step-by-step creation of a sample data base. There is a Brief at the beginning of each chapter, with a "cookbook" of sample commands for those intrepid (or impatient) souls who prefer to "wing it" and learn by experimentation.

dBASE II
Ashton-Tate
Hardware Required: H/Z100 with one disk drive, 128K RAM.

Operating System: Z–DOS
Description: dBASE II is a relational data base management system.
Documentation: Manual, approximately 375 pages, divided into two parts, one "written by a user as he learned to use his system," the other "written by the author of the program, Wayne Ratliff." Ashton-Tate recommends that you read the first part of the manual to learn what dBASE II can do, then use the second part of the manual as a reference as you generate your own programs.
Other comments: Elsewhere in this issue you will find a review of dBASE II by Wayne Rash, Jr.

We have received detailed information about these programs:

Condor rDBMS
$650; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Features:
—Condor rDBMS differs from Condor FMS, above, in that Condor rDBMS gives you capabilities such as indexing, report writing, and the ability to give commands which operate on more than one file.

Easy-Base Data Management System
$19.95; Husker Systems of Nebraska, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Easy Base is a data base management system.
Features:
—Easy Base is written in Z–BASIC, and the source code is provided.
—Easy Base is divided into five modules:
–A menu.
–"A Dictionary module which allows for creation of Data Dictionaries for data bases as well as establishing new, skeleton data bases."
–An Update routine which enables you to add, delete, or modify the information in the data base.
–A Sort module, which supports multiple sorts.
–And a Data Base Print utility which allows special formatted report printouts of your data bases, either to the line printer or to a disk file.
Documentation: User's manual.

1–2–3
$495; Zenith Data Systems
Hardware Required: H/Z100 with two disk drives, 192K RAM.
Operating System: Z–DOS
Description: 1–2–3 is an integrated software package including a data base, a spreadsheet, and graphics capabilities.
Other comments: 1–2–3 is a product of Lotus Development Corporation. For further information on 1–2–3, see the entry under "Spreadsheets."

Utilities

Utilities are programs which enhance the usefulness of your computer, often by making it possible for other programs or hardware devices to work more effectively. For example, in this section we have programs which make it easier to use the operating system; programs which enable you to use the full capabilities of your printer; programs which test your video monitor, and so on.

We have tried out these programs:

ALTCHR
$24.95; Software Wizardry
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: ALTCHR allows you to modify the characters displayed on the H/Z100 by editing the 8 x 9 pixel maps which form those characters.
Features:
In character-drawing mode, you can:
—Get a character and display its pixel map.
—Invert a character map.
—Perform a mirror operation on a character map.
—Shift a character up, down, left, or right on the pixel map.
Keyboard map definition:
—You can change the assignments of

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keys on the keyboard.
—You could, for example, change the assignments so that when you press the the "=" key, the screen display will be a "$".

Font map definition:
—You can define which entries the font table will display for each given code.

Reporting:
—You can print out your new pixel maps, keyboard map table, and font map table.

Documentation: 20 pages. Appendices.
Performance: The mirror, invert, and shift commands in the character-drawing mode are useful.
Ease of Use: It is easy to draw new characters using ALTCHR's pixel-mapping routine. It will take you some time, however, to design and implement a new alphabet. It took me about an hour and a half to create a new set of characters for the 26 upper case letters. That was even though I created each character as quickly as possible, by using just the pixel-mapping mirror function.
Other comments: The pixel maps are displayed on an 8 x 9 grid which takes up about a third of the screen. Each pixel is represented by a marker about the size of a dime. The character being mapped is shown, actual size, to the left of the grid, and changes in response to the changes you make in the larger pixel map.

Chronologic
$19.95; Software Wizardry
Hardware Required: H/Z100 with one disk drive, 128K RAM; Hayes Chronograph or other clock board desirable, but not necessary.
Operating System: Z–DOS
Description: When you boot Z–DOS, Chronologic tells Z–DOS the time and date entered in the last editing session.
Features: If you have a Hayes Chronograph, Chronologic will automatically access the current time and date.
Documentation: 10 pages.
Performance: Chronologic works the way it's supposed to.
Ease of Use: To install Chronologic, all you need to do is copy the program onto your Z–DOS system disk.
Other comments: The Chronologic documentation says that Chronologic can "be modified by the user or by special agreement with the author to support other hardware clocks. This involves a moderate degree of knowledge of 8088 assembly language and the hardware involved. It is not a simple modification, but a moderately experienced 8088 programmer should have little difficulty doing so, as the source code (provided on disk) commentary has been written to help simplify this process."

CHUG ZDOS Disk II
ZDOS Utilities
$7.00; Capital Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: A wide variety of Z–DOS utilities including a spooler, a stopgap editor, a phone dialer, a chronograph utility, SORT, SWAP terminals, and more.
Performance: I was unable to test all the programs on this disk, but I did establish that the print spooler works.

GRAPH100 for C. Itoh Prowriter
$39.95; Air Capital Computer
Hardware Required: H/Z100 with one disk drive, 128K RAM, C. Itoh Prowriter printer.
Operating System: CP/M–85
Description: This program reproduces the H/Z100 graphics character set on the 8510/8510A Prowriter printers.
Features:
—GRAPH100 can output "Picture" files created using The Software Toolworks' Ed-A-Sketch.
—Can output general text/graphic files, with some restrictions.
—Cannot handle reverse video text.
—Pictures printed on the Prowriter are slightly shortened due to the printer's eight-dot-high character cell versus the Zenith nine-dot-high character cell.
Other comments: Since *Sextant* doesn't have a C. Itoh Prowriter, we asked Samuel Yates of the Capital Heath Users' Group to evaluate GRAPH100. He found a few minor inconsistencies in the documentation, but his overall conclusion was favorable. "I was very pleased to be able to review GRAPH100, as it is a very well written and well documented software program that will enhance the capability of the user."

OZ100
$20.00; Computer Consultants to Business
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85
Description: OZ100 is a program to read Osborne format disks directly into H/Z100 disk format.
Other comments: "Programs to go from Zenith to Osborne are in final testing" and should be available by the time you read this.

Pattern
$29.95; Microservices
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: A set of test patterns for color and monochromatic monitors used with the H/Z100.
Features:
—You can display one, two, or four sets of color bars across the screen. This is useful in comparing the phosphor colors used by different monitor manufacturers. It's also useful in making adjustments to the intensity of the color on the screen, in conjunction with "bias" and "drive" video controls.
—You can test the horizontal and vertical resolution of the display.
—You can test the "linearity" of the display—that is, you can find out whether your monitor is putting straight lines on the screen.
—You can test the purity of the screen display by painting the screen solid in any color.
—You can test the convergence of the colors. This test tells you whether any of the pixels are "leaking" outside of their area on the screen.
Documentation: Four pages.
Performance: I tested our ZVM134, and, as expected, it was working fine.
Ease of Use: The program is menu-driven, and all the options are very clear.
Other comments: Microservices says it's working on a "color palette applications program ... which is capable of 92 hues for color graphics applications on the H/Z100s. This program contains procedures for painting from the palette, ... and is aimed towards users who have some familiarity with color graphics on the H/Z100s. The package is due to be released about the middle of June." I saw a demonstration version of Palette in early June, and it looked interesting. It's similar in some ways to Northwest Design's C.A.D. program, below.

We have received detailed information about these programs:

FLJSOFT
$19.95; FLJ Software Co.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: A graphics and printing utilities software package, to be used by assembly language programmers in program development. The package also makes it possible to modify Zenith's Interactive Business Graphics program.
Documentation: FLJSOFT.DOC file on disk.

SCDMP
$15; Digital Information Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM, Gemini 10/15 printer.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: SCDMP is a pixel-based screen dump utility for use with the Gemini 10/15 dot-matrix printer.
Features:
—Digital Information Systems says "the entire printing process requires about 10-15 minutes to complete."
—You can invoke SCDMP either from Z–

DOS or from within Z–BASIC.

ZDUMP
$29.95; Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: ZDUMP is a disk utility which allows you to display and change the contents of any area on a disk or in memory.
Documentation: Six pages.

Z100 Software for DumBurner EPROM Programmer
Ross Custom Electronics
Hardware Required: H/Z100 with one disk drive, 128K RAM. DumBurner 16K/32K EPROM programmer, interconnect cable for H/Z100 modem port J2 ("port EC").
Operating System: CP/M–85
Description: The H/Z100 software allows you to program Erasable Programmable Read-Only Memory (EPROM) chips.

We have received general information about these programs:

Compress
$22.95; Starside Engineering
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Saves disk space by reducing the size of text files from 40 to 50%.
Features: "Fully compatible with CP/M SQ/USQ utilities."

H89 to Z100 Conversion Utility
$24.95; Husker Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM; H/Z89; RS232C cable to connect the two computers.
Operating System: CP/M–85 on the H/Z100; CP/M–80 on the H/Z89.
Description: The utility allows direct transfer of ASCII data files and binary files between an H/Z100 and an H/Z89 (either way) using the utilities on each diskette.
Documentation: Instruction manual.

RDZDOS
$20.00; Computer Consultants to Business
Hardware Required: H/Z100 with two disk drives, 128K RAM.
Operating System: CP/M–85
Description: RDZDOS is a program that runs under CP/M–85 to transfer Z–DOS files to CP/M format.

Programming languages & language utilities

In this section you'll find descriptions of Z-BASIC, Zenith's version of Microsoft BASIC; S-BASIC, Sunflower Software's structured version of BASIC; and several sets of Z-BASIC programs intended to help you develop your own programs. This section also includes utility packages designed specifically to work with H/Z100 programming languages.

We have tried out these programs:

S–BASIC
$49.95; Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: S–BASIC is a programming language and associated translator designed to facilitate structured programming using BASIC.
Features:
—No line numbers.
—All desirable structured programming constructs are available, and they can be nested to any depth.
IF-THEN-ELSE, ELSE IF, ON-CASE, FOR-NEXT, WHILE, REPEAT-UNTIL, EXIT, LOOP.
—GOTOs and labels for use where necessary.
—All the capabilities of Z–BASIC.
—Provision for comments and auxiliary text that do not become part of the translated Z–BASIC program.
—Compatible with S–BASIC for the H/Z89.
Documentation: User's manual, 55 pages. Two sample S–BASIC programs included.
Performance: The S–BASIC translator translates S–BASIC to Z–BASIC at about 20 lines per second.
Ease of Use: I was able to write a simple program in S–BASIC after a quick glance through the manual. It would, of course, require careful study to become familiar with S–BASIC (or any other programming language, for that matter).
Other comments: Structured programming languages, like Pascal, are designed to make it easy to read, understand, and debug programs. They use a number of devices to that end. They avoid using GOTO statements, which can make arbitrary, confusing leaps from one part of the program to another; they indent nested subroutines, to clarify the hierarchical logic of the program; and they make it easy for the programmer to document his work.

S–BASIC uses BASIC's familiar commands in a structured way (unlike regular BASIC). You could say that S–BASIC is midway between BASIC and Pascal.

In *Sextant* #2, Summer 1982, there is an article called "Put Some Structure in Your BASIC Programming," by William K. Clarkson, the author of S–BASIC.

XREFBAS 2.0
$30.00; The Software Subscription
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: XREFBAS 2.0 creates an index of all the variable names and line numbers referenced in a BASIC program.
Documentation: Eight pages.
Performance: There are some public domain programs available to perform the same function. However, most of those programs are written in BASIC, whereas XREFBAS 2.0 is written in the C language with data structures specially designed to enhance speed. Hence, The Software Subscription says, XREFBAS 2.0 is as much as eighty times faster than public domain cross-referencers.

Z–BASIC
$175.00; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Z–BASIC is the Zenith version of Microsoft's implementation of the BASIC programming language.
Features:
Advanced graphics features:
—CIRCLE statement draws an ellipse; you may specify the center and the radius.
—PUT and GET statements transfer graphics images to and from the screen, making possible animation and high-speed object motion.
—DRAW statement enables you to draw horizontal, vertical, and diagonal lines.
—PAINT statement fills up a graphics figure (such as an ellipse or a rectangle) with a color (or with one of seven discrete shades of green, if you have a monochrome monitor).
Documentation: Two volumes. Approximately 450 pages. Glossary. Index. Reference Guide.

We have received detailed information about these programs:

ZMAP
$27.95; Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: This program cross references Z–BASIC programs and produces indexed lists of variable names, etc.

We have received general information about these programs:

Z–BASIC Utility Toolkit
$24.95; Husker Systems of Nebraska, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC

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☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Good
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Fair
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Poor
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BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

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Philadelphia, PA 19101

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BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

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Sextant Reader Service
P.O. Box 13558
Philadelphia, PA 19101

Description: The Toolkit includes a memo writer, an automatic letter generator from a data file, automatic label printers, more label printers, checkbook balancing routines, grade averaging, loan and interest computation, routines that use the graphics of the Epson MX series printers, and some routines that use the color and advanced graphics of Z–BASIC.
Documentation: User manual.

Communications

With a communications program and a device called a modem, you can enable your H/Z100 to "talk" to other computers via telephone, a capability which opens up many new applications. If you'd like, you can gain access to remote data bases (for example, you might want to consult a bibliographic reference service). If you have a computer at home, you can send information to the computer at the office. Or, if you wish, you can use dial-up bulletin boards.

The H/Z100 uses different integrated-circuit (IC) hardware than the H/Z89 and H8. Hence, if you are going to run a communications program on the H/Z100, you cannot simply run a CP/M program under CP/M-85, as you can do with many important types of software. Your communications program must have been written specifically for the H/Z100, like all the software listed below.

We have received detailed information about these programs:

CHUG Z–DOS Disk VI
ZBBS - Zenith Bulletin Board System
$7.00; Capital Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: A bulletin board system that runs under Z–BASIC.
Features:
—Permits the user to perform all of the common functions usually associated with a computer bulletin board.
—Provides the user with a message data base, bulletins, information, and ASCII file downloading.
—The program is set up to allow operation with a 300/1200 baud automatic modem.
Other comments: Donated to CHUG by Bill Taylor of Fort Mills, South Carolina.

MicroTerm
$79.95; MicroSystems Software, Inc.
Hardware Requirements: H/Z100 with one disk drive, 128K RAM; a direct connect modem or acoustic coupler.
Operating System: Z-DOS
Description: MicroTerm is a program which enables your H/Z100 to act like an intelligent terminal.
Features:
—"Spooled printer output and screen print function."
—"Translation tables with ready-made default files for most applications."
—Autodial from a list of up to ten numbers. Additional numbers may be read from disk files as needed.
—MacroKey function allows you to have up to ten user-defined "soft-keys" with a maximum of 64 characters per key.
—You can return to the main menu and execute MicroTerm commands while you are still receiving data; the screen will be updated when you return.
—From the menu, and without exiting MicroTerm, you can read disk directories and delete files.
—"Large capture buffer for uploading and downloading."
—"MicroTerm supports most major brands of modems, with full auto-dial capabilities where applicable."
Documentation: 101 pages in an IBM PC-style three-ring binder. Technical Manual. Glossary.

ZSTEM
KEA Systems Ltd.
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: Z–DOS (with BIOS version 1.00)
Description: ZSTEM allows the H/Z100 microcomputer to emulate the H/Z19, the H/Z89, and Digital Equipment Corporation's VT52 terminal, in order to communicate with other computers.
Features:
You may configure:
—Baud rate.
—Character size.
—Half or full duplex.
—Printer protocol, Xon/Xoff or ETX/ACK; (ETX packet size: 1-255).
—Soft keys. Any key (except Reset, Caps Lock, CTRL, Fast Repeat and Shift) can be programmed to "display and transmit any amount of text and/or control characters."
—Inter-character delay. 0 to 255 ms delay for "softkey or disk-transmitted text, as not all remote processors can keep up to their operating baud rate."
Disk transfer:
—ZSTEM allows the user to "capture" data being sent to the terminal, and put that data into a disk file.
—ZSTEM can also transmit ASCII program or data files to the remote computer.
Documentation: 18 pages.

ZT
$25.00; Codewright (Dale Wilson)
H/Z100 Terminal Program
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: Z–DOS
Description: ZT is a program which allows a H/Z100 computer to be used as a terminal, allowing you to send data to and from other computers.
Documentation: Manual, 16 pages.

We have received general information about these programs:

Computerized Phone System
$40.00; Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: CP/M–85
Description: CPS enables you to transfer data files via modem between your computer and other computers, including dial-up data bases such as the Source and CompuServe's MicroNet.
Features:
—You can define a special key which will automatically log you onto the dial-up data base. You can also define a key which will check to see whether you have received any electronic mail.
—Full error-checking.
—CPS displays elapsed time on screen.

STM
$99.95; Starside Engineering
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.

Please refer to the key to the right when completing the article evaluation form on the Reader Service Card attached above. By letting us know how interesting and/or helpful you found each feature in this issue of *Sextant*, you will help us choose the best articles for you in the future.

1. Wayne Rash, Jr., **dBASE II Comes to Heath/Zenith**, p. 9
2. L. R. (Roy) Broun, **Unconfusing the New User**, p. 17
3. Clair Doughty, **BASIC Battleship**, p. 25
4. Clay Jackson, **Make Your '8 Think Like an '89—Only Faster**, p. 29
5. Walter G. Jung, **Word Processing You Can Program**, p. 33
6. Hurley D. Cook, **Building Heathkit's H120**, p. 45
7. Richard M. Kane, **A Human Factors Evaluation of the Z110**, p. 55
8. Frederick Zimmerman, **Z100 Software Roundup**, p. 64
9. Stephen E. Auyer, **Index Your HDOS Disks**, p. 88
10. Virginia Vineyard, **Confessions of a Technoklutz**, p. 97

Operating System: Z–DOS
Description: STM is "an electronic communications facility"—a sophisticated modem program.
Features:
—STM allows the use of up to five physical modems at once, and can control up to five conversations with remote systems at once.
—It gives you an interpretive command language in which you can write procedures which can call and be called by other procedures, to execute now or at any time you set.
—Other application programs can build command files to be executed by STM.
—By using "packet transmission store-and-forward" techniques, it can pass data between systems which cannot directly call one another.
—STM "passes" ASCII streams, XMODEM blocks, and STM's own data packet format.

ZED-COMM
$49.95; Husker Systems of Nebraska, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: Z–DOS
Description: ZED-COMM is a modem control package which enables the H/Z100 to communicate with other computers, including dial-up data bases such as the Source and CompuServe's MicroNet.
Features:
—Supports baud rates from 45.5 to 38,400.
—HELP screens.
—"STAT command will display the entire status of your port including all settings."
—Can send and receive hexadecimal or binary files, automatically encoding and decoding the results.

ZLYNK/II
$29.95; Software Wizardry
Hardware Required: H/Z100 with one disk drive, 128K RAM, modem.
Operating System: Z–DOS
Description: ZLYNK/II is a modem utility package.
Other comments: ZLYNK/II had not been released as of June 13, 1983.

Graphics editors

Graphics editors are used to draw pictures on the screen. All the editors listed below can draw circles, ellipses, and lines; PAINT enclosed areas with a specified color; save pre-defined shapes to disk, and bring them back to the screen; and save a complete screen to disk.

We have tried out these programs:

Computer Aided Design
$79.95; Northwest Data Corporation
Hardware Required: H/Z100 with one disk drive, 128K RAM, high resolution color monitor.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Computer Aided Design (C.A.D.) is a graphics editor.
Features:
Using this package, you can:
—Create free hand drawings with the cursor control keys.
—Create user-defined shapes.
—Select the foreground and background colors of the display.
—PAINT designs and drawings.
—Add text to drawings.
—Save and load drawings from disk.
—Dump the screen to an MX–80 printer.
—Address each individual pixel on the screen.
Documentation: 11 pages. One annoying flaw: paragraphs are not indicated by any indentation on the left margin.
Performance: C.A.D.'s ability to address each individual pixel on the screen gives you complete control over the H/Z100 display. However, C.A.D. performs some operations faster than others. It's very good at drawing lines and ellipses, but it's rather slow at moving the cursor across the screen. It takes several seconds to move from one side of the screen to the other.
Ease of Use: C.A.D. uses the special function keys to control its graphics operations. The 24th and 25th lines of the screen display information about how to use each special function key.
Other comments: I'm not sure that C.A.D. is fast enough to use for truly elaborate graphics design, but it is certainly an enjoyable program to fool around with. Northwest Design says they are working on a light pen for the H/Z100. Should a light pen become available, it would probably speed C.A.D.'s operations considerably.

We have received detailed information about these programs:

ZDOS ETCHDUMP
Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: ETCHDUMP is a set of programs for drawing pictures, saving pictures to disk, reading pictures from disk, and printing them on the MX–80 printer.
Features:
—ETCHDUMP can change the foreground and background colors.
—A program called SCREEN is provided, which can take a file image of a red, green, or blue video plane, and print it to a MX–80 printer using Graftrax.
—ETCHDUMP can move the cursor to any pixel location specified by its *x* and *y* coordinates.
Documentation: Five pages on a README.DOC file.

We have received general information about these programs:

Glyphix/Z
$24.95; Starside Engineering
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Glyphix/Z is an interactive graphics sketchpad.
Features:
—Draws lines, boxes, ellipses, circles.
—You can edit and save shape tables.
—You can mix text and graphics anywhere on the screen.
Ease of Use: Glyphix/Z is "listable and commented", which means that you can print out a listing of the Z–BASIC program and modify it easily.

Home use

In the following section, we have included programs designed to help you manage your checking, savings, and charge card accounts; to help you solve quantitative financial problems; to help you teach your children arithmetic; to help you learn to touch-type; and to help you make decisions based on numerical criteria.

We have tried out these programs:

Decision Maker
$24.95; F & F Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Decision Maker is a program designed to assist you when you make decisions which involve choosing between several items with multiple criteria for each choice.
Features:
—Decision Maker asks you to identify your criteria, the primary features you are seeking in making your decision.
—Then it asks you to express the value of those features numerically.
—Then the program asks you to indicate how important each criterion is in relation to the other criteria.
Finally, Decision Maker computes the weighted value for each option, finds the highest value, and reports it to you.
Documentation: Four pages. Sample run included.

Math of Finance
$17.95; F & F Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Math of Finance is a set of programs designed to give the user the tools needed to solve quantitative financial problems.

Features:
Math of Finance functions include:
—Future value of a single payment.
—Present value of a single future payment.
—Future value of an annuity.
—Present value of an annuity.
—Sinking fund payment.
—Installment loan payment and amortization schedule.
—Business calculator with store and recall.
Documentation: Eight pages. Sample run.
Performance: You may print out the results provided by any function except the business calculator.

We have received general information about these programs:

ChkPro
$29.95; Newline Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: ChkPro manages checkbook, savings, and charge card accounts.
Features:
—ChkPro automatically calculates account balances as new data are entered.
—You may put individual entries into various categories, such as mortgage payments, loan payments, charitable contributions, etc. You may define up to 31 categories.
—A program called CHKPRINT is included, to print reports based on CHKPRO data.

Math
Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Math is a program designed to help elementary school students learn arithmetic.

Touch Typist
$29.95; Newline Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: CP/M–85 or Z–DOS
Description: Touch Typist is a program designed to help you learn how to touch type.
Features:
The package consists of three series of lessons.
—1) the T series, which introduces you to touch-typing on the standard typewriter keyboard.
—2) the N series, which teaches you how to touch-type on the numeric keypad.
—3) the S series, which gives you practice to help you increase your speed and accuracy. The program will measure your speed in words per minute and show your errors in reverse video.

Entertainment

I was a trifle disappointed to discover that most of the entertainment programs listed here do not take full advantage of the Z100's color graphics capabilities. Some significant exceptions, though: the various sets of "Z-BASIC Games" *do* make good use of Z-BASIC's powerful graphics commands.

We have tried out these programs:

ZBASIC Graphic Games
$20; Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Ten popular BASIC games, adapted to use the H/Z100's color capabilities.
Documentation: There is a README.DOC file on disk.
Performance: The games vary somewhat in quality. The SLOT machine game has entertaining color graphics. The DICE game, a version of Yahtzee, is perhaps the most entertaining two-player game. The HANGMAN game is fun, but the secret words are too easy to guess, especially if the player has read somewhere that the most frequently used letters in the English language are ETAIONSHRDLU,

HIGH CAPACITY DISK STORAGE FOR Z100

Cameo Electronics Model 1010

10.6 Mb

REMOVABLE CARTRIDGE
- Flexibility
- Security for sensitive data files
- Winchester speed

$5,995

Cameo Electronics Model 1040

40.2 Mb

SEALED DRIVES
- Expandable to 160 Mbytes
- High speed operation
- 6.98 Mbps transfer rate

$6,995

Up to four 1010 and 1040 systems can operate with the same controller. A special 1050 system is also available. This system includes one 1010, 10.6 Megabyte removable cartridge, unit and one 1040, 40.2 Megabyte sealed drive, unit for only $9,995.

All systems include cables, S-100 controller board, and either Z-DOS or CP/M-85 operating system.

Terms: Check, money order, or COD. FOB Bellevue, WA. We pay shipping costs for prepaid orders.

SAMMAMISH DATA SYSTEMS, INC.
1413 177th Ave., NE
Bellevue, WA 98008
Telephone (206) 644–2442

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in that order. HANGMAN would be more fun if there were a few words like "SYZYGY" in the DATA statements. The QUBIC game, a 4 x 4 x 4 version of tic-tac-toe, calls for some challenging three-dimensional thinking. The *Sextant* staff was able to beat it once in about twelve tries.

We have received detailed information about these programs:

CHUG ZDOS Disk III
$7.00; Capital Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Over 100 Z–BASIC games and demonstration programs.

CHUG ZDOS Disk IV
$7.00; Capital Heath Users' Group
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Z–BASIC Color demonstrations and several C program listings.
Features:
—Programs include Poker.

Color Games
Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Color Games is a package of five games for the H/Z100.
Features:
—Battleship.
—Blackjack.
—Othello.
—Yahtzee.
—Isolation.

Gametime 100
$24.95; Husker Systems of Nebraska, Inc.
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: A collection of 12 games for the H/Z100.
Features:
—A menu and a color graphics display are provided. The menu and the display can, however, be bypassed.
—Each package includes two versions of each game, one for color monitors, the other for monochrome.

We have received general information about these programs:

Millionaire
$99.95; Blue Chip Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: Millionaire is a game which allows the player to invest in a simulated stock market.
Features:
Provides information similar to that used by real-life investors:
—Charts of overall market activity over an extended period of time.
—Charts of the performance of selected industry segments; tables showing highs, lows, and most recent price for each stock.
—And a "Financial Journal" with business news. Using this information, the player can buy or sell stocks, call and put options, and so on.

Ordering Information

Air Capital Computer
1909 Siefkin
Wichita, KS 67208

Apogee Software
Box 15124
Savannah, GA 31416
912/925-3765

Blue Chip Software
19824 Ventura Boulevard
Suite 125
Woodland Hills, CA 91364

Ralph W. Boyd
761 N.W. 196th Terrace
Miami, FL 33169

Bromley Engineering
883 Cambridge Street
Cambridge, MA 02141
617/661-3414

Capital Heath Users' Group
P.O. Box 2653
Fairfax, VA 22031
will sell only to other HUGs

Cherry Engineering
P.O. Box 216
Laurel, MD 20707
301/498-4236

Codewright
(Dale Wilson)
231 Couch Avenue
St. Louis, MO 63122

Computer Consultants to Business
1033 Bishop Walsh Road
Cumberland, MD 21502
301/759-1260

CompuView Products, Inc.
1955 Pauline Boulevard, Suite 200
Ann Arbor, MI 48103
313/996-1299

Digital Information Systems
P.O. Box 189
Loma Linda, CA 92354
714/793-7236

Dimensional Business Systems
250 N.W. 4th Diagonal
Boca Raton, FL 33432
305/368-0270
or
4th Floor
199 Bay Street
Toronto, Ontario
CANADA
416/367-9882

Elektrokonsult AS
Konnerudgaten 3
N3000 Drammen
NORWAY

F & F Software
3632 Evans Road
Atlanta, GA 30340

FLJ Software Co.
P.O. Box 3293
Hialeah, FL 33013

Generic Software
P.O. Box 790
Marquette, MI 49855
906/475-7151

Golden Knights Software
Clarkson College
Potsdam, NY 13676

Heath Users' Group
Hilltop Road
St. Joseph, MI 49085
616/982-3463

Husker Systems of Nebraska, Inc.
4517 North 61st Street
Omaha, NE 68104
402/558-5702

Interaction Dynamics Systems, Inc.
P.O. Box 2459
Kailua-Kona, HI 96740

KEA Systems Ltd.
#311-811 Beach Avenue
Vancouver, B.C.
CANADA V6Z 2B5

Lexisoft, Inc.
P.O. Box 1376
Davis, CA 95617
916/758-3630

Links Comm
P.O. Box 2028
Reston, VA 22090

MicroProcessor Associates, Inc.
P.O. Box 3438
Nashua, NH 03061

Microservices
P.O. Box 7093
Menlo Park, CA 94025
415/851-3414

Other comments: In a December 1982 review, *PC* magazine called Millionaire "a fun, complex game and a real education in the art of playing the stock market."

Miscellaneous

As you might expect, this category is something of a catch-all.

We have received detailed information about these programs:

Applied Statistics
Hardware Required: Z100 with 1 disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: This program is "an integrated package of programs designed to carry out basic statistical analysis of experimentally obtained numerical data."
Features:
—Can make histograms (bar graphs).
—Reports standard statistical information on your data set (mean, variance, size of the set, range of the data, standard deviation, degrees of freedom).
—Comparison of two sample means (t & F test).
—Comparison of two samples, data in pairs (t test).
—Comparison of a sample mean with a known mean using the known standard deviation (U test), or the sample standard deviation (t test).
—Analysis of variance.
—Regression analysis.
Documentation: 29 pages.

CHUG ZDOS Disk V
$7.00; Capital Heath Users' Group
Files from MNet IBM PC SIG
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: Contains numerous BASIC files and Assembly listings written for the IBM PC. "An ideal disk for program hackers to test their skill at converting some useful items to run on the H/Z100."

EASY
Sunflower Software
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Description: EASY stands for Executive Appointment SecretarY. It is a program which maintains your appointment calendar.
Features:
—Calendar mode.
—Daily Appointment mode.
—Wide range of printing options.
—Uses the H/Z100's special function keys.
Documentation: 14 pages.

We have received general information about these programs:

ZCHART
Zenith Data Systems
Hardware Required: H/Z100 with one disk drive, 128K RAM.
Operating System: Z–DOS
Software Required: Z–BASIC
Description: ZCHART is a business graphics program based on the business graphics demo disk which comes with every Z100. It will allow interfacing to data bases, spreadsheets, and plotters.

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Index Your HDOS Disks

Putting a machine-language routine together with an understanding of the Heath Disk Operating System's directory structure makes it possible to build a comprehensive index of your disk files.

Stephen E. Auyer

A scene in a typical computer hobbyist's home:

Bob: "I thought I'd come over to run off a copy of that mailing list program you wrote."

You: "Unhhhh ... yeah ... sure ... I think it's on that Dysan disk with the scribbling on the jacket. Let me check."

(Mount disk and print a directory.)

You: "Nope. Not this disk. But *wow!* I'd forgotten I had those old versions of LIFE and STARTREK. I'll have to run them sometime for old times' sake."

(Mount more disks and print directories.)

You: "It's gotta be here somewhere—unless it's on that disk I let Doug take to school for 'Show-and-Tell.' Look, Bob, let me get things sorted out here and I'll give you a call."

Bob: "Okay. And if you can find it, I'd like to run a copy of that neat little binary sorting routine of yours."

Sound familiar? If you've got a floppy disk system and more than one or two disks, then something like this has happened to you in the past. Of course, there are ways around the filing problem. You can run off a directory of each disk and file away the printouts. Or you can keep a manual listing of all the programs on your disks. But none of these methods works really well. What you need to keep track of things is one complete listing of all the files on all your disks, in a nice alphabetical order. This article describes a program that will do just that for you.

HDOS directory structure

Under the Heath Disk Operating System (HDOS), each disk has a file, DIRECT.SYS, that contains a directory of the files on that disk. DIRECT.SYS contains the name of each file, its extension, flags, last date of modification, and pointers to its size. So, by mounting a series of disks and accessing the file DIRECT.SYS on each one, we ought to be able to build up a listing of all the files on all the disks. This is basically what is done by the master catalog program discussed here.

In practice, however, it turns out to be just a bit more difficult than you might suspect. The reason for this is that DIRECT.SYS consists of 18 sectors on each disk—enough space to store 23 bytes of information about each of 200 files. This information is stored in a fixed format: bytes 1-8 for the file name, bytes 9-11 for the extension, byte 15 for the flags,

Listing 1: An assembly-language routine to get the data in the disk directory and mount and unmount the disks. The numbers in the shaded area provide the DATA statements in Lines 1300–1410 of Listing 2.

```
MBASIC USR Disk Mount/Dismount Routines                    HEATH ASM #104.06.00
     (for a 65K system)                                    31-Dec-82  Page    1

                                00003           LON     G
   042.200                      00004           XTEXT   HOSDEF
   000.207                      00070           XTEXT   HOSEQU
   042.200                      00098           XTEXT   ASCII
   042.200                      00127           XTEXT   ECDEF
                                00176   *
                                00177   *       Memory useage is as follows:
                                00178   *
                                00179   *       65535 to 62035 permanently resident
                                00180   *                      HDOS (3.5K).
                                00181   *
                                00182   *       62035 to 59035 device drivers (3K).
                                00183   *
                                00184   *       59035 to 55285 HDOS overlays (3750).
                                00185   *
                                00186   *       55285 to 54285 safety region (1K).
                                00187   *
                                00188   *       54285 to 53285 user routines (1K).
                                00189   *
                                00190   *       53000 and below, MBASIC.
                                00191   *
                                00192   *
   324.015                      00193           ORG     54285
                                00194   *
                                00195   *       USER1 dismounts the disk mounted on
                                00196   *             SY1: (if one was present) and
                                00197   *             prompts the user to insert
                                00198   *             another disk. After that,
                                00199   *             channel CHAN is opened for
                                00200   *             reading.
                                00201   *
   324.015  315 100 324         00202   USER1   CALL    CLOSE
   324.020  041 133 324         00203           LXI     H,DEVSPC
   324.023  377 204             00204           SCALL   .RESET
   324.025  332 116 324         00205           JC      ERROR
   324.030  076 377             00206           MVI     A,CHAN
   324.032  021 140 324         00207           LXI     D,DEFALT
   324.035  041 146 324         00208           LXI     H,FNAME
   324.040  377 042             00209           SCALL   .OPENR
   324.042  332 116 324         00210           JC      ERROR
   324.045  311                 00211           RET
                                00212   *
                                00213   *       USER2 reads a block of 256 bytes
                                00214   *             from channel CHAN into BUFFER.
                                00215   *
   324.046  076 377             00216   USER2   MVI     A,CHAN
   324.050  001 000 001         00217           LXI     B,256
   324.053  021 225 324         00218           LXI     D,BUFFER
   324.056  377 004             00219           SCALL   .READ
   324.060  332 116 324         00220           JC      ERROR
   324.063  311                 00221           RET
                                00222   *
                                00223   *       USER3 Dismounts the disk on SY1:
                                00224   *             and closes channel CHAN.
                                00225   *
   324.064  315 100 324         00226   USER3   CALL    CLOSE
   324.067  041 133 324         00227           LXI     H,DEVSPC
```

bytes 17-19 for the size, bytes 20-21 for the date and so forth. Any unused bytes are filled with nulls (hexadecimal 00—zero-zero). Thus, for example, when the file name consists of only four characters, then bytes 5-8 will be null-filled.

And it is the nulls that cause problems, for in reading ASCII characters, a null character is ignored. This means that you can read DIRECT.SYS from BASIC, but only the non-null characters can be read: you lose track of whether a particular data byte corresponds to the file's flags, or its size, or its date, and so forth. To see what happens, try the command TYPE DIRECT.SYS or COPY TT: = DIRECT.SYS. What you will see is a listing of all the non-zero characters in DIRECT .SYS. And if you know what the file names are, you should be able to pick out most of them. But you will also notice that the listing for each file is fewer than 23 characters, and varies in length. This makes it extremely difficult to pick out the particular byte corresponding to the file's flags (for example).

Some BASIC problems

Benton Harbor BASIC gets around this problem by providing the CIN(n) function to read a single byte from channel "n". So it is possible to decode DIRECT.SYS from a BH BASIC program. The problem is that BH BASIC does not allow you to reset a disk drive; so you can only access the directory files for the disks that are mounted when you load BH BASIC. A machine-code routine could be used to mount and dismount disks but BH BASIC cannot call a machine-code routine. So much for BH BASIC.

Microsoft BASIC, on the other hand, will allow you to reset disk drives via the RESET "DEV:" statement. But MBASIC does not provide the equivalent of the CIN(n) function. However, MBASIC does allow calls to machine-code routines, so we can get around this problem. Looks like MBASIC wins out over BH BASIC in this case (and in most cases, as a matter of fact).

```
MBASIC USR Disk Mount/Dismount Routines                    HEATH ASM #104.06.00
     (for a 65K system)                                    31-Dec-82  Page    2

   324.072  377 201      00228            SCALL   .DMOUN
   324.074  332 116 324  00229            JC      ERROR
   324.077  311          00230            RET
                         00231    *
                         00232    *       Close channel CHAN.
                         00233    *       (system error 9 - "channel not open"
                         00234    *        is ignored)
                         00235    *
   324.100  076 377      00236    CLOSE   MVI     A,CHAN
   324.102  377 046      00237            SCALL   .CLOSE
   324.104  320          00238            RNC
   324.105  062 223 324  00239            STA     ERRC
   324.110  376 011      00240            CPI     9
   324.112  310          00241            RE
   324.113  072 223 324  00242            LDA     ERRC
                         00243    *
                         00244    *       Error handler.
                         00245    *
   324.116  046 015      00246    ERROR   MVI     H,CR
   324.120  377 057      00247            SCALL   .ERROR
   324.122  041 165 324  00248            LXI     H,MESSAG
   324.125  377 003      00249            SCALL   .PRINT
   324.127  076 000      00250            MVI     A,0
   324.131  377 000      00251            SCALL   .EXIT
                         00252    *
                         00253    *       Constants and storage.
                         00254    *
   324.133  123 131 061  00255    DEVSPC  DB      'SY1:',0
            072 000
   324.140  123 131 061  00256    DEFALT  DB      'SY1SYS'
            123 131 123
   324.146  123 131 061  00257    FNAME   DB      'SY1:DIRECT.SYS',0
            072 104 111
            122 105 103
            124 056 123
            131 123 000
   324.165  012 146 141  00258    MESSAG  DB      LF,'fatal error - back to
                                                    system' ,ENL
            164 141 154
            040 145 162
            162 157 162
            040 055 040
            142 141 143
            153 040 164
            157 040 163
            171 163 164
            145 155 212
   377.377               00259    CHAN    EQU     -1
   324.223               00260    ERRC    DS      2
   324.225               00261    BUFFER  DS      256
   325.225  000          00262            END     USER1

00262 Statements Assembled
39685 Bytes Free
 No Errors Detected
```

A machine-code routine

Since we are going to be using a machine-code routine to "get" the data in DIRECT.SYS one byte at a time, we might as well make the routine a bit longer and use it to mount and dismount the disks for us. Just such a routine is shown in Listing 1. It has three routines that are called by MBASIC to:

Reset drive SY1: by dismounting whatever disk was mounted on this drive and mounting a new disk. The file DIRECT.SYS on this disk is then opened for reading.

Read 256 bytes of data from DIRECT.SYS into memory.

Dismount the disk mounted on drive SY1:.

To simplify the MBASIC/machine-code interface, no data is passed by the calls and returns: MBASIC calls one of the routines, the routine does its thing and then returns to MBASIC. In the case of the second routine, the data read from DIRECT.SYS is transferred to MBASIC by using the PEEK(n) function to "look into" the area of memory where the data has been placed.

These routines are set up for a machine with 64 kilobytes of memory. If your machine has less than this, you can change the ORG statement correspondingly. These routines and the MBASIC program will run just as well on a 56K machine—any less than that and the MBASIC program becomes very limited.

These routines assume that you've got a two-drive or three-drive system and can keep the program on drive SY0: while swapping the disks to be catalogged on and off of SY1:. It would probably be possible to do everything from a single-drive system. But then things get pretty cumbersome; I wouldn't recommend it.

The MBASIC program

Now that we have the machine-code routines to access DIRECT.SYS, we need an MBASIC program to drive the routines. The program to do this is shown in Listing 2. There are several well defined functions in this program.

Lines 1200-1520 set up the machine code routine in random-access memory (RAM). The octal numbers representing the routines are entered in DATA statements where they may be read and POKEd into memory. The addresses of the three entry points are set up with DEF USR statements.

Lines 1530-2340 read the information about the files from DIRECT.SYS on a number of disks and store the information in several arrays.

Lines 2350-2490 sort the file names.

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Listing 2: The Disk Master Directory Program.

```
1000 REM ************************************************************************
1010 REM *                                                                      *
1020 REM *                    DISK MASTER DIRECTORY PROGRAM                     *
1030 REM *                                                                      *
1040 REM * This program mounts a series of disks on drive SY1: and reads        *
1050 REM * the file SY1:DIRECT.SYS to determine the files on the disk.          *
1060 REM * After all disks have been read, a sorted listing of the file         *
1070 REM * names is printed.  This program is set up to run on an H8 with       *
1080 REM * 56K of RAM although it could be easily modified to run on a          *
1090 REM * machine with 48K.                                                    *
1100 REM *                                                                      *
1110 REM * All memory locations for system variables are for HDOS 2.0           *
1120 REM *                                                                      *
1130 REM *                          Stephen E. Auyer                            *
1140 REM *                          65 Pollock Avenue                           *
1150 REM *                          Pittsfield, MA  01201                       *
1160 REM *                          (413)-447-7185                              *
1170 REM *                                                                      *
1180 REM ************************************************************************
1190 REM
1200 REM - Set up the program.
1210 REM
1220 CLEAR 2000,53000!(54500!)
1230 DEFINT A-Z
1240 DIM A(3),V$(256),FI$(500),FL(500),FV(500),DA!(500),M$(12),FF$(4)
1250 FMAX=500
1260 TD$="": FOR I=0 TO 8: TD$=TD$+CHR$(PEEK(8383+I)): NEXT I
1270 REM
1280 REM - Define the machine-code routine.
1290 REM
1300 DATA &315,&100,&324,&041,&133,&324,&377,&204,&332,&116,&324,&076
1310 DATA &377,&021,&140,&324,&041,&146,&324,&377,&042,&332,&116,&324
1320 DATA &311,&076,&377,&001,&000,&001,&021,&225,&324,&377,&004,&332
1330 DATA &116,&324,&311,&315,&100,&324,&041,&133,&324,&377,&201,&332
1340 DATA &116,&324,&311,&076,&377,&377,&046,&320,&062,&223,&324,&376
1350 DATA &011,&310,&072,&223,&324,&046,&015,&377,&057,&041,&165,&324
1360 DATA &377,&003,&076,&000,&377,&000,&123,&131,&061,&072,&000,&123
1370 DATA &131,&061,&123,&131,&123,&123,&131,&061,&072,&104,&111,&122
1380 DATA &105,&103,&124,&056,&123,&131,&123,&000,&012,&146,&141,&164
1390 DATA &141,&154,&040,&145,&162,&162,&157,&162,&040,&055,&040,&142
1400 DATA &141,&143,&153,&040,&164,&157,&040,&163,&171,&163,&164,&145
1410 DATA &155,&212,&000
1420 REM
1430 REM - Poke routine into RAM.
1440 REM
1450 FOR I=0 TO 134: READ D: POKE 256*&O324+&O15+I,D: NEXT I
1460 REM
1470 REM - Set up addresses of machine-code routines.
1480 REM
1490 DATA &324,&015,&324,&046,&324,&064
1500 FOR I=1 TO 3: READ A1,A2: A(I)=0: AA!=VARPTR(A(I))
1510 POKE AA!,A2: POKE AA!+1,A1: NEXT I
1520 DEF USR1=A(1): DEF USR2=A(2): DEF USR3=A(3)
1530 REM
1540 REM - Everything's set up, begin accumulation of file names.
1550 REM
1560 INPUT "Should system, 'S' flag, files be skipped <YES/NO>";S$
1570 IF LEFT$(S$,1)="Y" OR LEFT$(S$,1)="y" THEN IS=128 ELSE IS=0
1580 INPUT "Should deleted files be skipped <YES/NO>";S$
1590 IF LEFT$(S$,1)="Y" OR LEFT$(S$,1)="y" THEN ID=1 ELSE ID=0
1600 INPUT "Should listing go to the line printer (LP:) <YES/NO>";S$
1610 IF LEFT$(S$,1)="Y" OR LEFT$(S$,1)="y" THEN S$="LP:" ELSE S$="TT:"
1620 OPEN "O",#1,S$
1630 PRINT "Beginning accumulation of file names."
1640 PRINT "If a disk is presently mounted on SY1: it will be dismounted."
1650 PRINT "If no disk is mounted, insert the first disk in drive 1."
1660 LINE INPUT "Hit RETURN when ready.";S$
1670 PRINT: NF=0: ND=0
1680 ND=ND+1: NC=0: NR=0
1690 IF ND<=256 THEN 1750
1700 PRINT: PRINT: PRINT "Have accumulated the maximum number of disks."
1710 PRINT "Increase DIM from the present 256.": GOTO 2350
1720 REM
1730 REM - Mount disk and open channel.
1740 REM
1750 Y=USR1(0): IE=0
1760 INPUT "Identification for this disk is";V$(ND)
1770 REM
1780 REM - File name.
1790 REM
1800 NF=NF+1: F$=""
1810 IF NF<=FMAX THEN 1840
1820 PRINT: PRINT: PRINT "Have accumulated the maximum number of files."
1830 PRINT "Increase DIM from the present";FMAX;".": GOTO 2350
1840 GOSUB 2800
```

```
1850 IF IE THEN 2260
1860 IF C=0 THEN 1920
1870 IF C<>255 THEN 1940
1880 IF ID THEN 1920
1890 GOSUB 2800: IF C=0 THEN 1930
1900 F$="?"+CHR$(C)
1910 FOR I=3 TO 8: GOSUB 2800: F$=F$+CHR$(C): NEXT I: GOTO 1960
1920 GOSUB 2800
1930 FOR I=3 TO 23: GOSUB 2800: NEXT I: GOTO 1840
1940 F$=F$+CHR$(C)
1950 FOR I=2 TO 8: GOSUB 2800: F$=F$+CHR$(C): NEXT I
1960 F$=F$+"."
1970 REM
1980 REM - Extension
1990 REM
2000 FOR I=9 TO 11: GOSUB 2800
2010 IF C=0 THEN F$=F$+" " ELSE F$=F$+CHR$(C)
2020 NEXT I
2030 REM
2040 REM - Skip 12, 13 and 14.
2050 REM
2060 GOSUB 2800: GOSUB 2800: GOSUB 2800
2070 REM
2080 REM - Flags
2090 REM
2100 GOSUB 2800: FL(NF)=C
2110 REM
2120 REM - Skip 16, 17, 18 and 19.
2130 REM
2140 GOSUB 2800: GOSUB 2800: GOSUB 2800: GOSUB 2800
2150 REM
2160 REM - Date
2170 REM
2180 GOSUB 2800: D1=C: GOSUB 2800: D2=C: DA!(NF)=256*D1+D2
2190 REM
2200 REM - Skip 22 and 23
2210 REM
2220 GOSUB 2800: GOSUB 2800
2230 FV(NF)=ND: FI$(NF)=F$
2240 IF FL(NF) AND IS THEN 2250 ELSE 1800
2250 NF=NF-1: GOTO 1800
2260 REM
2270 REM - End of directory for this disk.
2280 REM
2290 NF=NF-1: INPUT "Another disk <YES/NO> ";S$
2300 IF LEFT$(S$,1)="Y" OR LEFT$(S$,1)="y" THEN 1680
2310 REM
2320 REM - Dismount the last disk.
2330 REM
2340 Y=USR3(0)
2350 REM
2360 REM - Have accumulated all files, sort file names.
2370 REM
2380 M=NF: M2=M
2390 M=INT(M/2): IF M=0 THEN 2510
2400 M=M OR 1: J=M+1
2410 L=J
2420 I=L-M
2430 IF FI$(I)<=FI$(L) THEN 2480
2440 SWAP FI$(I),FI$(L): SWAP FV(I),FV(L)
2450 SWAP FL(I),FL(L): SWAP DA!(I),DA!(L)
2460 IF I<=M THEN 2480
2470 L=I: GOTO 2420
2480 IF J=M2 THEN 2390
2490 J=J+1: GOTO 2410
2500 REM
2510 REM - End of sort, print directory.
2520 REM
2530 DATA Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec
2540 FOR I=1 TO 12: READ M$(I): NEXT I
2550 DATA C,W,L,S
2560 FOR I=1 TO 4: READ FF$(I): NEXT I
2570 PRINT #1," ": PRINT #1,TAB(27);"DISK MASTER DIRECTORY"
2580 PRINT #1,TAB(33);TD$: PRINT #1," ": PRINT #1," "
2590 T$="                FILE     FILE"
2600 PRINT #1,T$
2610 T$="                NAME     EXT.     FLAGS     DATE          LOCATION"
2620 PRINT #1,T$: PRINT #1," "
2630 FOR I=1 TO NF
2640 EX$=RIGHT$(FI$(I),4): NA$=LEFT$(FI$(I),LEN(FI$(I))-4): F$=""
2650 FOR J=7 TO 4 STEP -1: IF FL(I) AND 2@J THEN F$=F$+FF$(J-3)
2660 NEXT J: IF F$="" THEN F$="none"
2670 D1=INT(DA!(I)/256): D2=DA!(I)-256*D1: YR=(D2 AND 254)/2+70
2680 DA=D1 AND 31: MO=8*(D2 AND 1)+(D1 AND 224)/32
2690 DA$=RIGHT$(STR$(DA),2)+"-"+M$(MO)+"-"+RIGHT$(STR$(YR),2)
2700 PRINT #1,TAB(15);NA$;TAB(24);EX$;TAB(33);F$;TAB(43);DA$;TAB(57);V$(FV(I))
2710 NEXT I
2720 REM
```

Lines 2500-2760 print the master directory.

Sample run

A sample of the program's output is shown in Listing 3. There are several points that may be made from this example.

1. Before beginning to catalog the disks, the program prompts you for several responses. The first response is to indicate whether system, "s" flag, files should be included in the master directory. Your answer to this will probably be "NO". If you answer "YES" you run the risk of two-thirds of your master directory's being a repetitive listing of all the system files that are on each disk. Each disk carries GRT.SYS, RGT.SYS, and DIRECT.SYS and you don't really want to see these listed over and over.

2. When a file is deleted, HDOS patches the first letter of the file name to FF (hex). The second response required of you is whether you want deleted files to appear in the master directory. Aside from the curiosity of seeing what you've deleted, these files may be recoverable if there have been no subsequent writes to the disk. These "deleted" files show up in the master directory with the first character in their name replaced by a question mark. Thus if you deleted a file named TEST.BAS, it would appear as ?EST.BAS in the master directory.

3. Since listings may be long, and you may want a permanent copy, your third

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response concerns whether you want the master directory to be listed on the line printer (LP:). If not, the listing goes to the console (TT:).

4. Instead of using the volume number on the disk, the program will prompt you for a short identification for each disk as it is mounted. I've found that, careful as I try to be, I eventually end up duplicating volume numbers. You may do the same thing—especially if you trade disks with your friends. So this allows you to use a different identification than when the disk was first initialized.

5. The program tries to be "user-friendly," but it is possible to cause an error. This will most likely occur in the machine-code routines if you try to mount a disk that has not been initialized, one that does not contain the file DIRECT.SYS, one that has a corrupt file structure, or what not. In this case you get the message "fatal error—back to system"—and that's just what happens.

One other item to keep in mind is that DIM statements in the program limit the number of file names in the master directory and the number of disks that can be catalogged. Present limits are a maximum of 500 files and 256 disks. If you reach either of these limits, the program will refuse to accept more disks and will print out the master directory containing the 500 file names. The program as written will run on a 56K machine; so if you have a 64K machine, you can increase the DIM statements and catalog substantially more files.

Restart capability

The most time-consuming portion of the program's operation is the decoding of the file names in DIRECT.SYS, since a lot of string manipulations are involved. Depending upon the number of file names in the directory, this process can take from 30 seconds to over a minute

```
2730 REM - End of program.
2740 REM
2750 PRINT #1," ": PRINT #1," ": PRINT #1," "
2760 PRINT #1,TAB(20);NF;"files listed on ";TD$: CLOSE #1: STOP
2770 REM
2780 REM - Routine to return characters in SY1:DIRECT.SYS, one byte at a time.
2790 REM
2800 IF NC>0 THEN 2840
2810 REM - Read a block of 256 characters.
2820 Y=USR2(0)
2830 REM - Increment pointers.
2840 NC=NC+1: NR=NR+1: IF NR<=506 THEN 2860
2850 NR=0: NC=0: GOTO 2820
2860 IF NC<=256 THEN 2900
2870 REM - Skip last 6 bytes out of each 512.
2880 NC=0: NR=NR-1: GOTO 2820
2890 REM - Get character.
2900 C=PEEK(256*&O324+&O225+NC-1)
2910 REM - Check for end of file.
2920 IF C=254 THEN IE=1
2930 RETURN
2940 END
```

```
                DISK MASTER DIRECTORY
                      31-Dec-82

FILE      FILE
NAME      EXT.      FLAGS      DATE          LOCATION

?84TEST   .ABS      none        8-Mar-80     Disk #003
?84TEST   .ASM      none        8-Mar-80     Disk #003
?ISE      .ABS      none       10-Dec-80     Disk #003
?ISE      .ABS      none        7-Dec-80     Disk #003
ARTICLE   .TXT      none       31-Dec-82     Disk #022
ASCII     .ACM      none       25-Feb-80     Disk #003
ASM       .ABS      none        5-Jan-80     Disk #003
AT        .DVD      none        9-Jun-80     Disk #003
AT4DVD    .ASM      none       27-Dec-80     Disk #003
EDIT      .ABS      none        5-Jan-80     Disk #003
HDOS      .ACM      none       27-Feb-80     Disk #003
HOSDEF    .ACM      none       25-Feb-80     Disk #003
HOSEQU    .ACM      none       25-Feb-80     Disk #003
LISTING1  .LST      none       31-Dec-82     Disk #022
LISTING2  .LST      none       31-Dec-82     Disk #022
MBPROL    .ABS      none       27-Feb-80     Disk #003
MBPROL    .ASM      none       27-Feb-80     Disk #003
SET       .ABS      none       26-Feb-80     Disk #003
TXTCON    .ABS      none        6-Jan-80     Disk #003
USR       .ASM      none       31-Dec-82     Disk #022
WISE      .TXT      none       10-Dec-80     Disk #003

        21 files listed on 31-Dec-82
```

Listing 3: A sample of the output of the Disk Master Directory Program.

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per disk. And if you have many disks to catalog, the minutes add up. So you'd rather not have to repeat the process to add just one or two disks to the catalog. While the program described above does not have the ability to restart from an existing catalog, a few simple patches will give it that ability. The patches are shown in Listing 4. What they do is cause the program to write a data file named FILENAME.DAT on SY0: at the conclusion of each run. This file contains the catalog information on all the disks catalogged so far. At the start of each run, the program will ask whether you wish to restart the catalog from a previous run. If you answer in the affirmative, file FILENAME.DAT is opened and the contents read. The program then proceeds from there as before.

The advantage of restarting is that it is very easy to update your master catalog in a short time. Of course the disadvantage is that you have created another file on SY0: and, if you have a large library, this file can consume 20-30 blocks. And if you haven't left enough space on SY0: to create such a file, you'll get a disk I/O error in line 2521 and have to start all over again. The restart function, therefore, is provided as a series of patches which you may or may not implement depending upon your needs.

```
1621 INPUT "Should program restart from data file <YES/NO>";S$
1622 IF LEFT$(S$,1)="N" OR LEFT$(S$,1)="n" THEN GOTO 1630
1623 OPEN "I",#2,"FILENAME.DAT": INPUT #2,NF,ND
1624 FOR I=1 TO NF: INPUT #2,FI$(I)
1625 INPUT #2,FV(I),FL(I),DA!(I): NEXT I
1626 FOR I=1 TO ND: INPUT #2,V$(I): NEXT I
1627 IR=1: CLOSE #2
1661 IF IR THEN 1680
2521 OPEN "O",#2,"FILENAME.DAT"
2522 PRINT #2, NF;ND
2523 FOR I=1 TO NF: PRINT #2,FI$(I)
2524 PRINT #2,FV(I);FL(I);DA!(I):NEXT I
2525 FOR I=1 TO ND: PRINT #2,V$(I): NEXT I
2526 CLOSE #2
```

Listing 4: A patch to Listing 2 to enable the directory program to restart from an existing catalog retained as a disk file.

And a caution

I should note here that this program was written under MBASIC version 4.82, which allows three expressions for the CLEAR statement. In line 1220, the first is used for string space, the second sets the upper limit for BASIC, and the third sets the lower limit for the system. However, the older version 4.7 supports only two expressions for CLEAR. So you will want to drop the third.

If that's the case, though, you will also want to be careful about some other points. For whatever reason, memory seems to be much more critical. The program must be resident on SY0:, it can't be on the 8" drive. Nor can the 8" driver be loaded. Additionally, you won't be able to use the newer, larger, printer drivers. The 10-sector LP.DVD that comes with HDOS seems to work fine, though.

Needless to say, therefore, I would be happy to hear any comments or criticisms. One natural question to raise, for instance, concerns how easily this program can be modified to cope with 8" disks. I'm certain there are others. So while you're finding out where all your files are, perhaps you could be thinking about ways to stretch this program even further.

Have fun!

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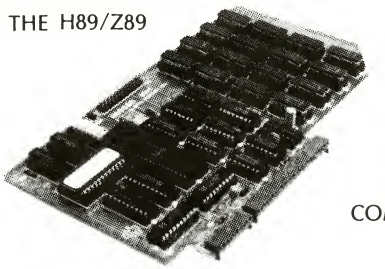

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Luminaries

Stephen A. Auyer is a program manager for General Electric in Pittsfield, Massachusetts. His experience in computers goes back to the days of couriers carrying decks of punched cards to the central processing site—and maybe dropping them into a puddle on a rainy day. Some such experience may have impressed on him the need to have good records of what's filed where.

L. R. (Roy) Broun is, if it isn't obvious, the "Roy" of Roy's Electronics (Coolin, Idaho), whose Zenith Data Systems computer products make it easier for folks on parts counters to keep a handle on the inventory—and whose writing efforts make it easier for them to keep a handle on the computer.

Hurley D. Cook started out as a chemist but for the last ten years or so has been an account executive writing technical copy for public relations firms. Now a senior consultant with Hill and Knowlton in Chicago, he's also branching out as a free-lance technical writer. So he may very well keep his H100 as busy a word processor at home as the '89 is at the office.

Clair Doughty got his Bachelor of Science degree from Northern Illinois University and works as a programmer/analyst for David C. Cook Publishing Company in Illinois. Perhaps he shall explain to his daughters that when some people started playing the game, battleships were bigger than carriers. To some of us, they always will be.

Clay Jackson is a product support specialist for Microsoft's consumer products division, answering customer inquiries. (He's on the Heath Users' Group bulletin board on MicroNet a lot, too, doing much the same thing on a volunteer basis.) In *Sextant* #6, Spring 1983, he described how to cool off your H8. So it was only a matter of time before he got around to speeding it up as well.

Walter G. Jung is a consulting author on subjects such as integrated circuits. Writing about circuitry, it's fitting that he gets the circuitry to help with the writing. And not surprising that he has developed a fondness for the software that puts the circuitry to work.

Richard M. Kane is a human factors consultant in Arlington, Virginia, with an M.A. in engineering psychology. At work, his province is the human factors of things like computerized control rooms for power stations. At home, the human-computer interface takes place (need we say?) with a Z110.

Wayne Rash, Jr. is a lieutenant (j.g.) in the U.S. Navy. Since he works in data processing, we should point out that his opinions are not necessarily those of his employer. We may, however, hope that the data-handling capacity of microcomputer software will help to wean the NAV away from its addiction to mainframes.

Virginia Vineyard is yet another of our authors who have told all about themselves in their articles. She may have thought thereby to spare herself having this section mention her with some contrived reference to the acquisition of computer competence. (But we have to make a tie-in to the article somehow—it's editorial policy.)

Confessions of a Technoklutz

The spirit of trailblazing technological excellence continues to gain new recruits.

Virginia Vineyard

A technoklutz is not someone too dumb to solder electronic bits and pieces together as instructed. Anyone who can slipcover a sofa or make a sauce Béchamel can build a Heathkit. Learning to use it is the problem. A technoklutz is someone who can't operate the stereo system at home because they've lost the user's manual and can't figure out the dials, buttons and levers. Technoklutzes are afraid to touch the one marked "Dolby" because they don't know what a Dolby is. A technoklutz is someone who doesn't know a microwave from a megahertz, or a byte from a baud.

I am a technoklutz.

My husband finally bought an H89. It was a very sensible purchase, he explained, since he wanted to keep up with the computer revolution, our son is taking computer classes in college, and I spend hours at the typewriter learning the craft of fiction writing. All three of us would benefit, he assured me. I couldn't argue, because I had read about word processors and was tempted—even though I couldn't operate anything more complicated than an on-off switch.

Take it slowly

After he had everything together and running, he sat me down before the machine and began the instructions. One switch to turn everything on—easy. Insert disks just so—almost as easy. Now, read the manual and do just what it says—not easy. But after a couple of hours, I was shaping verbiage into the priceless prose of Lincoln's speech at Gettysburg. This is fun! A few more hours of practice and I was ecstatic. The H89 with Magic Wand is to the typewriter what permanent-press with a dryer is to an ironing board.

Still, I learned to proceed with caution. Before I turn on the computer, I pull out my own list of simplified instructions: one, turn on the computer; two, observe "Hi" (yes, I know the prompt is really H colon, but I choose to think of it as a friendly greeting); three, mount disks, etc. This is necessary because a technoklutz can get confused about which way to turn a dial. I once forgot to type END and lost an hour's work.

We quickly set a routine. I used the computer until my son came home, dropped his books, and hovered eagerly while I shut down. He worked at the keyboard until dinner. After dinner, my husband practiced his programs, my son studied for classes, and then hovered over his father.

A few months later, my husband casually remarked that perhaps we should have waited to buy our computer—the Heathkit Electronic Center had a sale on H89s at a bargain price. I've been married to him for over thirty years, so I have no excuse for not paying more attention the next weekend when he said he was going to do some shopping. A couple of hours later, he returned with several large boxes and a sheepish grin. He'd gotten our son his own H89. Well, at least it keeps the kid off the streets and out of the video arcades. I don't know how he continues to get good grades. Maybe he's given up sleeping.

Anyone who can slipcover a sofa or make a sauce Béchamel can build a Heathkit.

And it grows on you

Magazines also appeared—*Sextant*, *REMark*, *Byte*, *Popular Computing*, etc. I tried to read all of them, and even understood some of what I read. Recently, a friend asked me how a computer works. I still can't believe it, but I opened my mouth and heard words like binary system, bits, bytes, RAMs and ROMs coming forth. My husband laughed himself silly when I told him about it, but I was euphoric over how much I had taught myself.

My husband next mentioned to me that the looks of my manuscripts could be a problem. He wasn't sure that dot-matrix print on fan-fold paper was acceptable to editors. Well, I said I'd just set the printer to double strike and photocopy the pages. No problem.

However, I began checking the ads for daisy-wheel printers. Remember, I've known him for over thirty years. I shuddered at the prices and insisted on my method. Wait until I'm good enough to find a publisher, I insisted. So, he didn't get a daisy-wheel printer. He waited until he saw the kind he wanted on sale; it has a gadget called a thimble.

Well, there we were with two H89s and three printers. He had a lot of fun getting the new addition running, but I haven't learned to use it yet. Not only are there all those confusing switches, but it yells at me when I do something wrong. A technoklutz is easily intimidated by machines, but I'll eventually teach that baby who's boss.

The printer didn't come with a tractor feed. The store that sells the tractor mechanism is in Anaheim. The Heathkit store is also in Anaheim. Last Saturday, my husband went to buy the tractor feed, then came home empty handed—but with another sheepish grin. Yes, he got the tractor feed, it was in the car—with a few other large boxes.

I don't know why I was so shocked, since I'd seen the Heathfreak and the hacker both drooling over the pictures and articles on the new H/Z100. I just don't know where we're going to put it. Still, there's that chapter in the user's manual on elementary programming in BASIC that looks simple enough for any technoklutz. If I can follow the directions, that is.

I do have my foot down and my voice raised on one subject, though. Until the HEROs are strong enough to mop kitchens and take out trash, I don't care how adorable they are, one of them is not coming into this house.

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Contact your local Heathkit Electronic Center, or DG Electronic Developments for further information.

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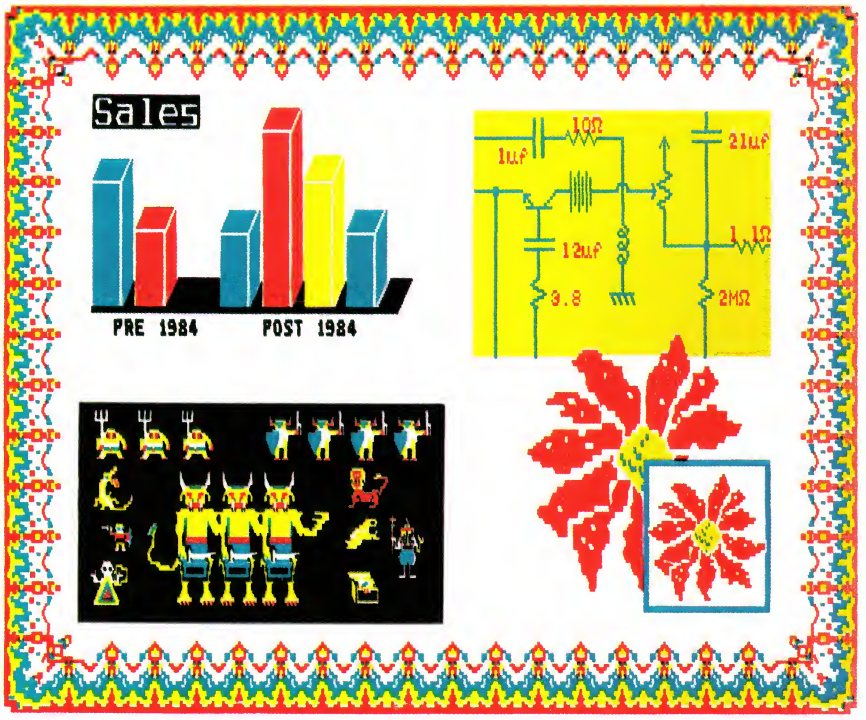
Supplier Notes

H/Z100 Color Graphics Editor Creates Tables of Symbols

SymEd is a color graphics editor from New Horizons Software which gives the user individual pixel control in painting tables of symbols. These tables serve as reusable alphabets which can be painted on the screen to form pictures. SymEd's symbols and graphics screens can be used from outside the editor; designs such as sales charts, fanciful creatures for video games, and educational text may be summoned by the user's own BASIC or assembly language programs.

SymEd utilizes the full eight colors provided by the H/Z100, although it runs equally well with monochrome graphics. The graphics screens can be printed on most dot matrix and impact printers; SymEd is configured for black and white printing on MPI printers and the Epson MX-80 with Graftrax Plus.

Written in 8086 assembly language, SymEd runs under Z-DOS on the H/Z100 and requires 128K of system RAM. The price is $79.95. For additional information, write to: New Horizon Software, 7115 Blanco Road, Suite 114–177, San Antonio, TX 78216.

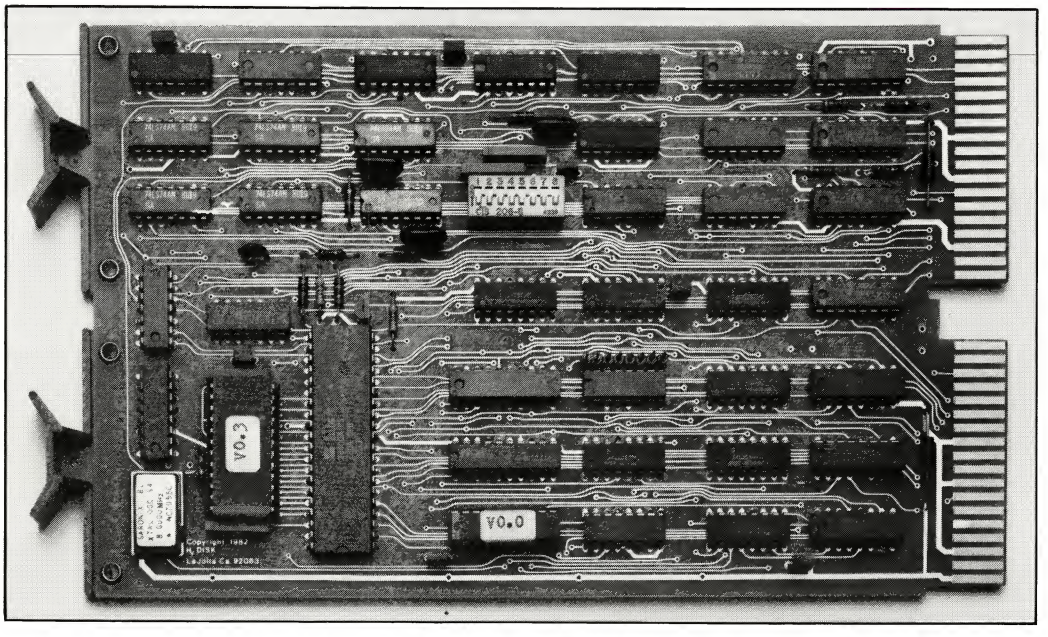


Z-11 Co-Processor Puts CP/M on the H11

The Z-11 co-processor from HyDisk allows H11 users to run CP/M 2.2 on their computers and peripherals. With the Z-11, CP/M programs such as SuperCalc, WordStar, MBASIC, and dBASE II, as well as thousands of others, can be run on the H11 or any other RX01/RX02 floppy disk based CPU. Utilizing a Z80A processor, the Z-11 can be run on any 56 Kbyte H11 not using bus refresh, with a serial or parallel line printer.

The architecture of the Z-11 utilizes the existing H11 memory via DMA, making the Z-11 cheaper and easier to install. Installation is accomplished by simply inserting the dual wide card into a Q-Bus slot, placing the distribution disk into the RX01/RX02, and booting the system using the existing bootstrap. The console responds with the familiar A> of CP/M. Since the Z-11 directly accesses the H11 memory, disk data is immediately available without any transfer from H11 memory.

The price of the Z-11 is $695. For further information, write to: HyDisk, 4540 Kearny Villa Road, Suite 204, San Diego, CA 92123 (619/277–8753).



Scuttlebutt

Buss: The Independent Newsletter of Heath Co. Computers, issue #70, June 20, 1983: "Barry Watzman resigned from Zenith Data Systems May 31st. The former computer product line director told *Buss* he regrets the circumstances that he felt forced him to do so. He stressed that leaving ZDS was his voluntary choice. Barry noted he'd presented the resignation as advance notice of his departure, but that ZDS chose to make it immediate. The man who'd had responsibility for Heath/Zenith computers since November 1, 1979 called it 'the best job I ever had,' saying he'd enjoyed most of the 3½ years."

Al Dallas, contributing editor for *Buss,* predicted in issue #69 (May 26) that "I just see [Watzman] either leaving Heath in frustration or turning into a button-down Zenith man . . .", so we asked Al for his comments on Watzman's resignation. He noted that **Heath/Zenith has lost "a very potent talent."** He pointed out, on the other hand, that the computer world at large had gained Watzman's talent—and that Barry hasn't necessarily left the Heath/Zenith community.

In *Sextant* #4, Winter 1983, we reported that **T & E associates** had created an HDOS program which could read disks from Exxon Office Systems' Qyx Intelligent Typewriter ("T & E associates: 'Just Home Folks' Implementing HDOS Utilities"). It was an impressive accomplishment. (For one thing, Qyx disks rotate *backward.*) But we didn't think there would be much of a market for this particular piece of software.

We were wrong. Tom Cauthen of T & E tells us that some folks up at **M.I.T.** read our article and contacted him about his software. It turns out that the people at M.I.T. have a bunch of '89s and **forty Qyxes.** And to think that we thought we were the only Qyxotic organization in the Heath/Zenith community!

We notice that more than one *Sextant* author has signed over an article payment check directly to a Heathkit Electronic Center. Here in Washington, that might be dubbed an "**off-budget expenditure.**"

In *Sextant* #6, this department reported that Kelly Russell of the New Orleans Heath Users' Group was concerned that Zenith hasn't been doing enough advertising. Many Heath/Zenith users have shared that concern—and so have some people within Zenith Data Systems. At the West Coast Computer Faire in March, Barry Watzman, then computer product line director for Heath/Zenith (see above), told a Heath Users' Group audience: "**I am absolutely not in agreement with Zenith's current policy of advertising, public relations, and promotion.**" A caveat: Watzman's decision to resign was *not* precipitated by this disagreement with ZDS marketing strategy. However, his departure seems likely to have the unfortunate consequence that a strong voice for more aggressive advertising has left Zenith Data Systems.

The **Family Computer Camp** at Clarkson College used three different types of computers this summer. Appropriately enough, campers aged 5 through 7 were assigned Apple IIs, and 8- through 14-year-olds used Ataris. **Reserved for ages 15 and up: the Z100.**

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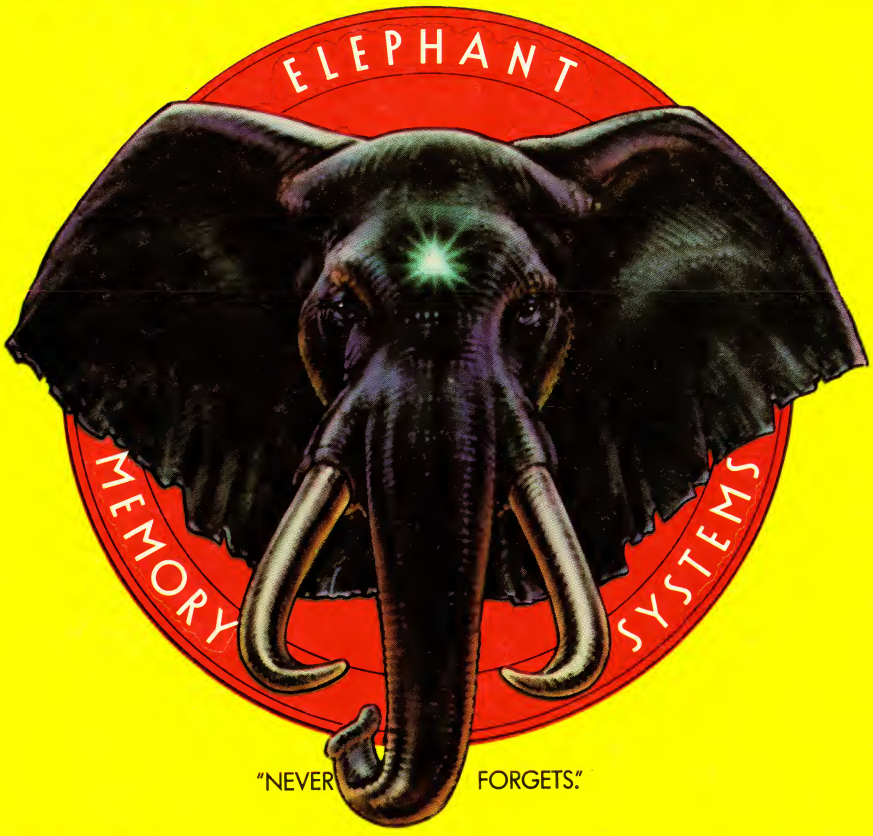

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